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July 1988

Radio Control CAR ACTION

THE WORLD'S PREMIER R/C CAR MAGAZINE

Canada \$3.75



Build the
"DUSTER
540"

New

THUNDERSHOT



Homemade
**WIND
TUNNEL**

Ready-To-Run
GTP FIERO

New Column:
World Champ
**JOEL
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60 MPH
ELECTRIC
FUNNY CAR!



SCOPING OUT:
We Test R/C Electronic
Products



**BURNIN'
DOWN THE HOUSE!**



1896 47380 3



29 10 BEST

OUR choices,
by category—
with all the
reasons!!



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COVER: This month's hyperactive cover features the scratch-built Von Erich 540 Duster caught in the glow of the desert-disturbing Rocket Plazma's wake, while down below, the Firefox brings new meaning to the term "BURN-OUT"!!!

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EDITORIAL

by LOUIS V. DeFRANCESCO JR.

Why not? Why not get the *Radio Control Car Action* editors together to collectively vote for the best cars in each category? The criteria, however, weren't just speed and price. Other important variables were dependability, design integrity, versatility, after-market product support, market appeal and our own opinions based on all the track tests we've performed over the past two years. There are many different scales, but we kept within the most popular 1/10-scale category. Let us know if *our* winners would have been *your* choices.



There's plenty of other great stuff in this issue, including a (gasp!) rocket-powered R/C car, basics on painting ABS plastic bodies, building your own wind tunnel, a neat home-built "Duster 540" by the wizard of R/C, Eric Goldschrafe, and much more.

We also have two new columns: Rudy Meyer, a knowledgeable electrical engineer, will be testing radio-control electronic equipment on the most sophisticated testing apparatus available. This column will let you, the consumer, who is dishing out the bucks for these products, see if they meet the manufacturers' claims. The first test is of the new PDI Zeta programmable speed controller.

Our other new column is about racing and racing strategy, and it's by the World Champ himself, Joel Johnson. He's an ace, and I'm sure you'll want to hear what he has to say.

One final note: I've heard that the new Clint Eastwood movie has Clint chasing a criminal who attaches bombs to R/C cars to do his dirty work. Amazing!

Letters



Crazed with R/C

There's only one word for your magazine—"Hot"! I like reading over and over the track reports you do in this wild mag.

I'm crazed with R/C. I recently purchased a Kyosho Icarus and was wondering if you knew about any hopped-up parts that could make the Icarus perform better. Why don't you do a track report on this happenin' machine?

PAUL FLANIGAN
Seneca Falls, NY

Dear crazed Paul, like any other car, the Icarus will benefit from an electronic speed control and a hot motor. I think the one it comes with is more than enough, but it's not ROAR-legal, as it's a 550 can. Ball bearings can also be added, and the price of these has been coming down. You probably don't know that the far superior front end from the Cosmo can be added to the Icarus because they both use the same bathtub chassis. The Cosmo front end has much more travel. Instead of plastic hinges, the Cosmo has upper and lower arms that ride on shafts. The plastic hinges on the Icarus give the suspension unwanted resistance at this plastic hinge point, which is also a weak spot. I hope I've helped. Oh yes, our review of the Icarus was in the Summer '86 issue of RCCA. CC

Left Out of Shootout!

All right, Steve! You did a great job on the "Monster Truck Shootout."

I have a High Roller and a Monster Beetle, but there was one monster truck that I didn't see in the Shootout—the Varicom Big Grizzly 4WD. Just wondering why.

CARTER A. LAMB, JR.
Chicago, IL

I'd like to comment on your "Monster Truck Shootout." All seemed fair in scoring and testing, except for one thing.

One truck was left out—the Varicom Grizzly monster truck. This truck was readily available to the public at the time of the Shootout. Why wasn't it in the Shootout?

NICK SMITH
Orlando, FL

I am 13 years old and I have the Hornet and the Big Grizzly. I bought your magazine and it's the best car magazine I've read. The "Monster Truck Shootout" in the May '88 issue didn't include the Varicom Big Grizzly. I know it's a new product, but so is the Midnight Pumpkin, and this was featured. Why wasn't it included in the Shootout?

NICKY BARNETT
Palm Harbor, FL

Guys, at the time of publication, we were told that the Big Grizzly was going out of production. Because of this, the distributor requested that the truck not be included in the Shootout. Had it been our choice, we would have liked to include the Grizzly. This would have allowed those of you who already own a Grizzly to compare its performance with the rest of the field. SP

Monster Need

I'm very interested in your "Project Monster Beetle" article (Dec. '87 issue). For the last three months I've been trying to beef up a monster of some kind, but none of the local hobby shops have had any experience with this sort of thing, so my advisers are few. Your article is very useful; do you have any additional information that might help me? I'm building my monster for local pulls and off-road events, and I'm fairly new to the R/C experience.

MICHAEL J. WATTS
Tulsa, OK

Michael, take a look at the "Monster Truck Shootout" in the May '88 issue of Radio Control Car Action. This will give you an idea of how these trucks perform

in different events. You mentioned that you'd like to build a monster for truck pulls and for off-road racing. For the truck pulls, the 4WDs usually dominate for obvious reasons. However, if you intend doing any off-road racing, your best bet is a 2WD. If your local club has a pulling class for 2WDs, you can add a set of double wheels for the sled pull and simply remove them for off-road racing. This will save you the expense of buying separate trucks for each event. Keep on truckin'! SP

NASCAR Aussie

I must compliment you on your article on Petty's stocker, as it's very helpful on graphics reproduction. I can't wait to get started on this project so that I can be the first to have a 1/10-scale NASCAR in the land of Aussies. I've written to the companies mentioned in your story, and I hope they can supply me with the necessary parts for my car.

NASCAR racing has just started in Australia, with a tri-oval track being built in Melbourne, Victoria. The first race was held on February 28 with 25 American drivers, including Bobby Allison, Kyle Petty and Neil Bonnett. Fifteen of our local drivers had cars built up, only to be destroyed during the race—but that's the *appeal* of stock-car racing.

R/C stock-car racing should now take off in Australia.

STEPHEN TONGUE
Australia

Stephen, sounds like you people down-under got off to a smashing start. Nevertheless, you blokes have a reputation for never giving up; I'm sure you'll get the hang of it right quick! G'day mate! CC

We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, due to the tremendous number of letters we receive, we cannot respond to every one.



The Inside Scoop

by CHRIS CHIANELLI

THE R/C CAR industry is rapidly advancing, with new products being offered at a head-spinning rate. So, I'll make manufacturers nervous, but feed you R/C squirrels who are hungry for info, by bringing you a special report on security leaks and "late-in" items. Here goes!



RALLY TO THE OPERA

RIDING IN STYLE! Looks like Kyosho is going upper class in lower scale with this 1/20-scale Mercedes rally car. A four-door Mercedes rally car? I didn't know there was one! Maybe the designers are staying out too late or listening to too much American rock 'n' roll. I think the driver is wearing a Rolex!

* * *



Left: Pure Gold has a machined end bell in new style. Wet mags too.
Right: New stock motor has different end bell.

HOLY TRINITY!

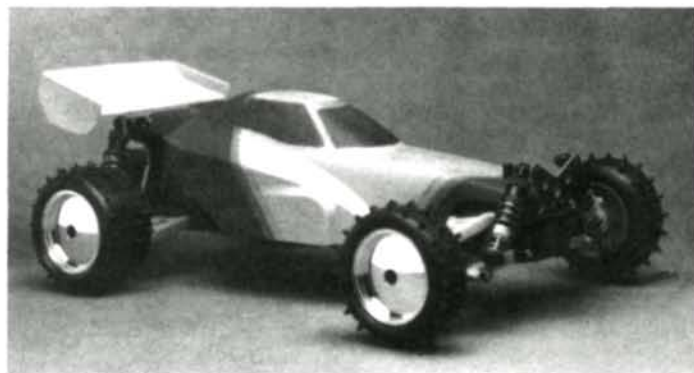
JUST IN... the new generation of Trinity motors wreak havoc at Whippoorwill Speedway in Orlando, FL. Trinity won every Invitational Class. Jeff Davis won the Twinn Caddy 125, Dave Hechler won the Novak 650, Mike Gien won the 1/12-scale Invitational and Dave Hechler won both the Twister Showdown and the

1/10-scale Invitational. Oh, by the way: during the Two-Minute Run, Joel Johnson was the first guy *ever* to drive an electric car faster than 50mph. His Trinity-powered Predator is the fastest 1/10-scale car in the world!... Uncle Ernie is smiling!

* * *

SHOTGUN FROM MRP: 4WD, mid-motor, ball-differential rear, adjustable ball-differential front, mono-front shock/dual rear shock, shaft drive, full ball bearings.

* * *

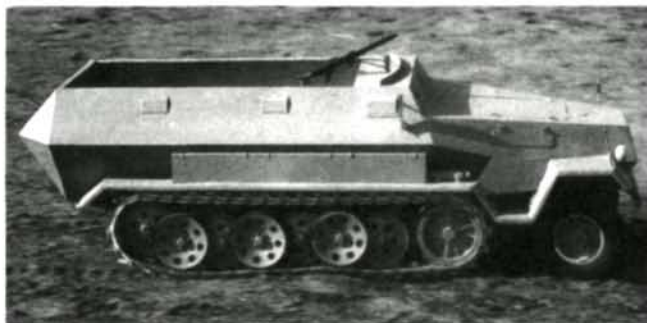


AYK PRO-100

THIS IS AYK'S LATEST—a mid-motor, chain-drive 4WD competition-oriented car. I can't tell you much at this point, but a quick glance at the Toledo show showed me that this car has potential.

Why? I've said it before and I'll keep on saying it... simplicity of design. Some might tell you, "Yea, my car has 15 differentials." I say K.I.S.S.—KEEP IT SIMPLE, STUPID!

* * *



STAY OUT OF THE WAY, OR ELSE!

OUR SPY IN JAPAN was only able to get a quick glance before this gas-powered half-track spotted him and opened fire. Don't you wish you could be in this thing when some wimp tries

to nerf you off the course because he can't win like a true sportsman? If Lingafoon gets brave, maybe he'll try to get more info on this intimidating machine.

* * *

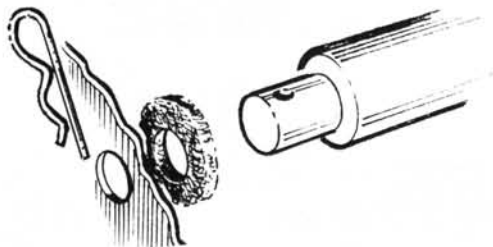
R/C PARADISE

CUSTOM WORKS R/C, manufacturers of the Dominator, "The Unfair Advantage," is putting the finishing touches on Racers' Haven in Bakersfield, CA. The 51,000-square-foot facility will have asphalt and off-road racing tracks with covered pits for over 250 racers. Racers' Haven will house only R/C-related businesses and will be the new home for Custom Works R/C, Revtech and Autographics. For more information, contact Racers' Haven, 7401 White Lane, Bakersfield, CA 93309.

* * *

Pit Tips

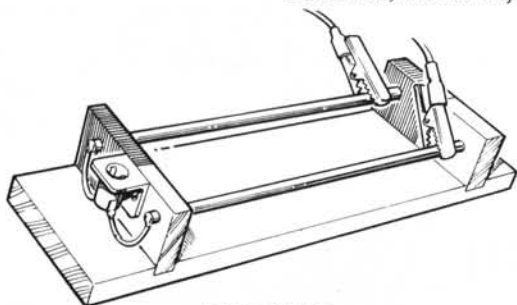
by JIM NEWMAN



BODY-MOUNTING PADS

If you have a car body that's painted on the inside, constant chafing during races might wear away the paint around the mounting posts. A cure for this can be found in the foot-treatment aisles of your drug store: felt corn pads. They come in various sizes, so you can choose a size which fits nicely over the mounting post. If you can't find these, use self-adhesive felt material and make them yourself.

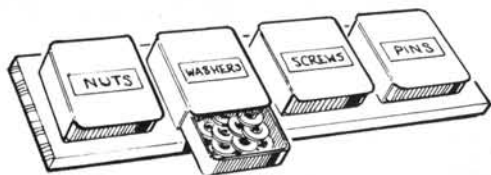
David Lake, Mission Viejo, CA



BUS BARS

A group of friends often share the same 12V auto battery during a race. To make the attachment of chargers more convenient, our contributor devised this bus-bar system. Two pieces of copper rod or pipe are held in this wooden stand. The stand is colored half-red and half-black to identify the positive and negative bars. Heavy wire and spring clips connect the bars to the auto battery, then the chargers in use can be clipped to the bus bars. Notice the cigarette-lighter socket wired across the ends of the bars to cater to any charger equipped with such a plug. Be sure the copper rods are far enough apart, so that clips can't short from one to the other.

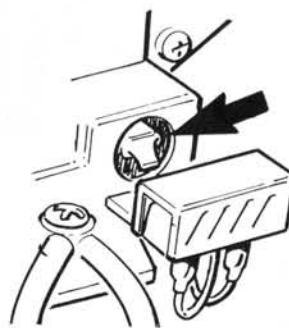
Nels Anderson, Framingham, MA



SPARES STORAGE

These are automotive fuse tins from the local auto-parts store. Glue as many as you need to a strip of wood and then label them clearly as to their contents. This fits neatly into a field kit and is easily found—unlike the loose tins, which seem to be lost at the most critical moments.

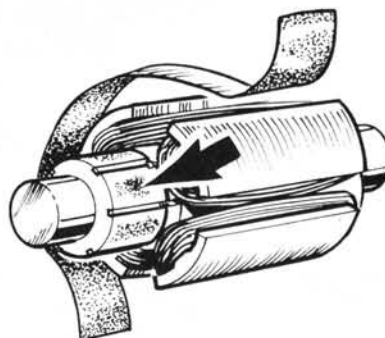
Ken McDonald, Cincinnati, OH



QUICK CRYSTAL ACCESS

During a race, it's sometimes necessary to change frequency. If you own a Fox, this can be time-consuming because of its sealed, dustproof chassis. The trick is to drill a 1/2-inch-diameter access hole over the crystal socket. Using taper-nose pliers on the plastic tab (not on the crystal case), the crystal may be readily extracted, and after the replacement is fitted, the hole is covered with a piece of adhesive vinyl tape.

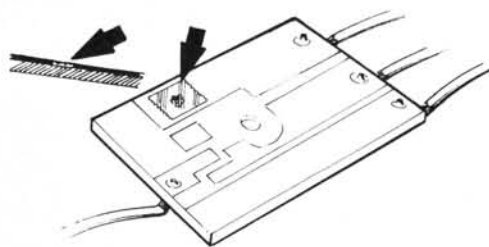
Richard Kastner, Spring Hill, FL



DIRTY COMMUTATOR

If your car needs a little nudge to get it to run, you might have a dirty or burnt commutator. Our correspondent suggests removing the commutator and polishing it with fine steel wool. I was taught to pass a strip of very fine (No. 600) emery paper around the commutator after lifting the brushes. After allowing the brushes to keep the paper sprung against the commutator, spin the armature back and forth to polish the copper commutator segment. Doing it this way ensures that you don't alter the shape of the commutator or leave bits of steel embedded in the insulation, which could cause problems later.

Robert G. Roy, Saint John, N.B., Canada



CONTROLLER BURNOUT

Here we show the copper foil on a Super Shot controller, and you'll notice that arcing (or sparking) has burnt a hole in the foil. Our contributor's remedy was to put a spot of slow-setting CA in the hole and then quickly cover it with cellophane adhesive tape until it had cured. I assume that he polished the spot with something like No. 600 emery paper after the tape was removed. His controller now functions properly.

Thor Are Helge, Blommeholm, Norway

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o **Radio Control Car Action**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

CIRRUS BAJA 250

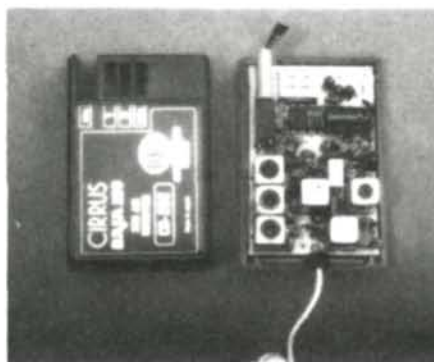


Top: The latest two-stick from Hobby Shack features a dual-position neutral for throttle and quick-change crystal on the front of the transmitter.
Left: Note the servo-reversing switches to the right of the left-hand foot stand on the bottom of the transmitter box.

by CHARLIE KENNEY

HOBBY SHACK'S LATEST TWO-STICK HAS B.E.C.

THIS MONTH, I'll review the Baja 250, which is one of the newest Hobby Shack* Cirrus radios. This 2-channel radio is used for both boats and cars, but I'll zero in on cars.



In spite of the built-in BEC, CR-202 retains small size—very important with 1/12-scale on-road cars.

The transmitter front panel is of black plastic and brushed aluminum, and the lower front, the bottom, the sides, the top and the back are made of light-gray plastic—very attractive. The Baja 250 has servo-reversing on both channels. The receiver has a built-in battery eliminator circuit (BEC), which supplies battery voltage from the vehicle Ni-Cd power pack, thus eliminating the need for a separate receiver and servo battery pack. This simplifies the wiring and reduces weight by approximately 4 ounces.

The Baja 250, as delivered, consisted of the RC-2J transmitter, CR-202 receiver, two CS-228 servos and a UM-3x4 battery holder. In addition, a switch harness, frequency flag, two spare horns and servo-mounting hardware were provided. My system for this evaluation operated on Channel 78, 75.750MHz, and used purple and gray flags.

I'll highlight some of the system's

features:

Transmitter

- New stick system that allows sticks to be rotated ± 5 degrees by loosening the four mounting screws and rotating the bezel.
- Short stick levers make operation extremely easy.
- New neutral lever on the throttle allows two-position neutral setting of the throttle stick. Perfectly matched to the throttle position of electric motor or gasoline engine. The throttle stick can be changed to a ratchet system by installing a slider (available from Hobby Shack) and removing the centering spring.
- Servo-reverse switches (throttle and steering). Since each servo can be

switched between forward and reverse from the outside of the transmitter, linkage hookup is extremely easy.

- Voltmeter clearly shows the state of the battery.
- Crystal can be changed from the outside.
- Neck-strap hook is built in for optional strap (not provided).

Receiver

- BEC (Battery Eliminator Circuit) system enables the motor and receiver to share a Ni-Cd battery, so eliminating the need to buy a separate battery for the receiver and servo.

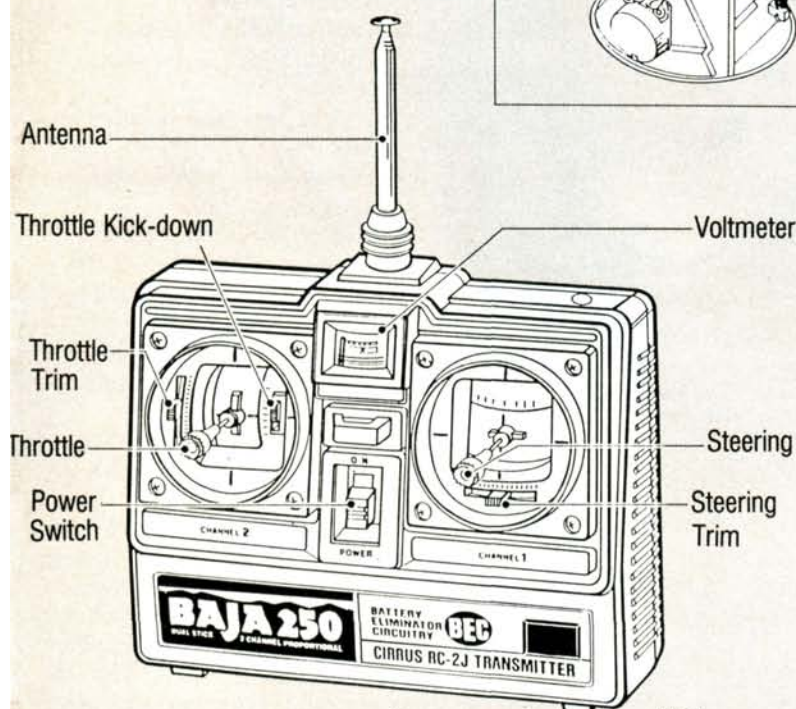
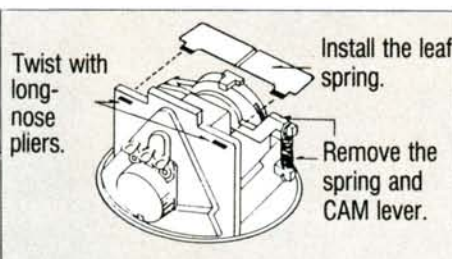


Fig. 1

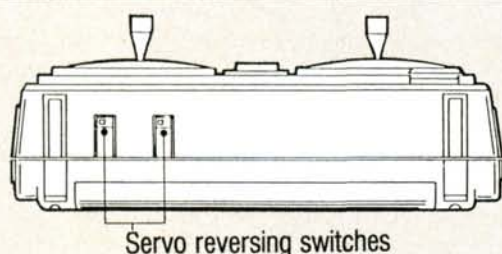


Fig. 2

TRANSMITTER (RC-2J)

Operating System: 2-stick; throttle and steering

Transmitting Frequency: 75.750MHz

Modulation: AM (Amplitude Modulation)

Power Required: 12V, 8 AA batteries (alkaline)

Current Drain: 170mA nominal

Antenna: 7-element whip, 34 inches long

Size: 6.50x6.25x2.20 inches

Weight (with batteries): 1 pound, 6 ounces

RECEIVER (CR-202)

Receiving Frequency: 75.750MHz

Intermediate Frequency (IF): 455kHz

Selectivity: 3kHz at 3dB points

Receiving Range: Roughly 550 yards on the water

Power Supply: 4.8V to 7.2V (when using BEC)

Current Drain: 7.2V/13mA; 4.8V/33mA

Dimensions: 1.46x2.19x0.75 inches

Weight: 1.34 ounces

Special Feature: BEC functions

SERVO (CS-228)

Control System: Positive-pulse width control
Operating Angle: One side 45 degrees or more

Power Requirement: 4.8V to 6V nominal

Current Drain (idle): 6V, 8mA

Output Torque: 48.7 ounces/inch

Operating Speed: 0.24 seconds/60 degrees

Dimensions: 1.6x0.8x1.6 inches

Weight: 1.92 ounces



All the necessary accouterments for the Baja 250. Note the dry-cell battery box, in case you want to bypass the BEC.

- High-performance, rugged, 2-channel AM receiver.
- Crystal socket uses a new type of sub-miniature connector pin for increased reliability. The crystal can be changed from the outside.
- Receiver is small and light for easy installation.
- Narrow-band ceramic filter allows use of R/C channels only 40KHz apart.

(Continued on page 62)

SCOPING

BY RUDY MEYER

OUT

We tested the Pro Zeta, the world's first speed controller with a microprocessor.

SCOPING OUT: As we're committed to bringing you the most up-to-date technical information on R/C products, Radio Control Car Action now has Rudy Meyer, an accomplished electrical engineer, to test the newest high-tech electronic equipment that's flooding the R/C market. "Scoping Out" is the first of a two-part test in which a product is first subjected to extensive bench testing using sophisticated electronic equipment and then actually used in the field. These tests will allow us to expose any ridiculous performance claims and, at the same time, provide R/C car enthusiasts with invaluable information on where they should put their money!



The very compact Pro Zeta and its programmer unit conform to your driving needs and style. This unit is a true microprocessor—no hype.

electronic speed controller. The Pro Zeta incorporates features that allow the driver to program the responses of the stick to match the car's performance. These response parameters include the following:

- Trigger/Stick response
- Acceleration rate
- Variable brake amplitude
- Trigger/Stick full speed set position
- Trigger/Stick start of speed set position
- Trigger/Stick variable brake set position
- Trigger/Stick 100 percent brake set position
- Trigger/Stick end of brake set position

Other features included in the Pro Zeta are a built-in voltage regulator for powering the receiver from the motor battery; the capability of using up to a 10-

NOT TOO LONG AGO, model racing cars were tethered, ran in circles, and used glow engines and simple drive trains for power. The late '60s saw state-of-the-art R/C progress to a point where R/C cars became both practical and economical, and the hobby really took off. Progress doesn't stop, and R/C technology advances constantly, so to keep all you enthusiasts up-to-date, this article will deal with the latest in electronic devices for the hobby.

First, one of the newest items—the Pro Zeta programmable, computerized, electronic speed controller by P.D.I.* Speed controllers started out as the resistor type, but they produced a lot of heat and didn't supply all the power to the motor. They also got dirty (causing erratic operation) and seemed to wear out quickly. The electronic speed controller eliminated many of the problems inherent with the resistor type, but refinements in the last couple of years have made them even more reliable and capable of handling the higher current associated with today's motors.

The Pro Zeta goes several steps further in refining the

cell battery pack; a bypass feature (which allows you to use the unit with a 4-cell battery pack and still power the receiver from the motor battery); an automatic power MOSFET thermal shutdown; and software de-glitch filtering.

The Pro Zeta is the first user-programmable electronic speed controller that comes packed with a data sheet, instruction manual and hand-held programmer. While the unit is well-made, the user should read every page of the instruction manual before using this device. Care must be taken in mounting and hook-up. The Pro Zeta was tested using a Futaba* transmitter/receiver, an oscilloscope and a power supply equipped to monitor both voltage and current.

With the Pro Zeta hooked up and the test equipment and programmer connected, the various parameters were selected on the programmer and transmitted to the speed controller. It might sound complicated, but all you do is set the seven switches on the programmer to "on" or "off," according to the instruction manual, and then push the "send" button. If everything was done correctly, the light on the speed

(Continued on page 68)

Track Report



FROM
FINE DESIGN ENGINEERING

FIREFOX II

Where there's smoke,
there's Firefox!

by T.J. LYN



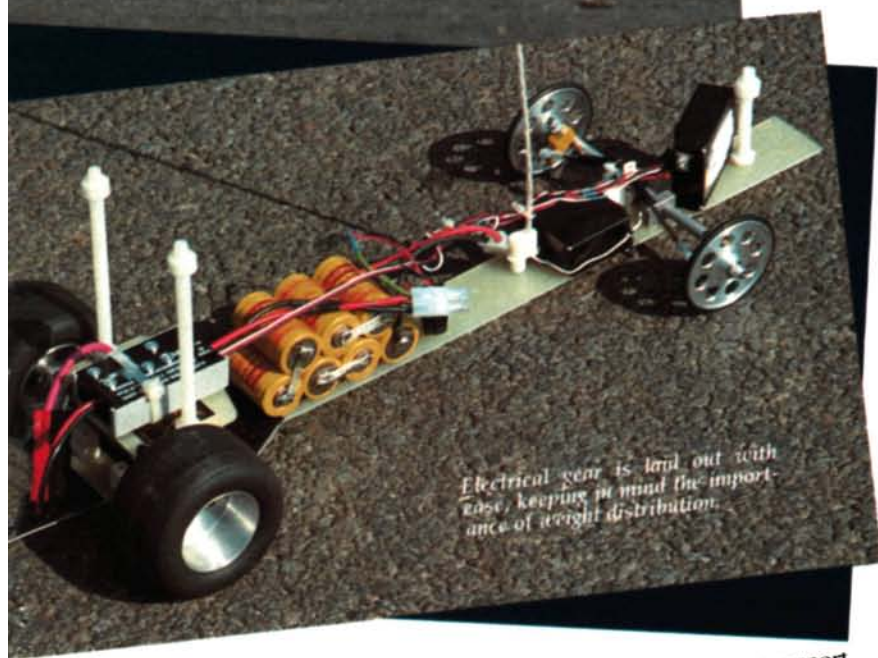
*Drag racing will
delight spectators
and participants of
all ages.*

IT'S SUNDAY AFTERNOON; the sun is high and so is the excitement level. The ground rumbles to a thunderous roar of 1,200 horsepower that propels a sleek single-seat funny car 1,320 feet in less than six seconds. In a flash, all that remains is the smell of burning rubber and the eye-burning fumes of nitromethane. You can feel the excitement produced by the vibrations of these

BURNIN' DOWN THE HOUSE!



The Firefox is lean and mean, standing ready, complete with wheelie bar.



Electrical gear is laid out with ease, keeping in mind the importance of weight distribution.

fabulous machines. For years, drag racing has been a great spectator sport, providing the greatest thrills in motor sports. R/C drag racing is also alive, well and growing at a remarkable pace. The formula, whether it be for full-scale or R/C cars, is simple: Load the greatest possible horsepower into the lightest controllable package.

Fine Design Manufacturing* has kept this formula in mind and has created one of the most competitive funny cars imaginable. The chassis of the Firefox II is simple, light and uses a thin fiberglass plate. The rear pod is of a plastic/nylon composite and houses a steel axle and bearings, but if you want to take your car's performance one step further, Fine Design has an optional graphite rear axle. This rear assembly is uncomplicated and is designed to deliver quick

Type	Funny car
Scale	1/10
DIMENSIONS:	
Overall Length	23 inches
Width	7 inches
Wheelbase	12½ inches
Front Track	5¾ inches
Rear Track	5¾ inches
WEIGHT:	
Gross (w/rec. bat.)	
7 cells	2 lbs., 13 ozs.
14 N-cells	2 lbs., 15 ozs.
BODY:	
Type	Oldsmobile funny car
Material	Lexan
CHASSIS:	
Type	Flat plate
Material	Fiberglass
DRIVE TRAIN:	
Type (prim./sec.)	Direct drive
Differential	None
SUSPENSION:	
Type: Front	Spring-loaded king-pin
Rear	None
TIRES:	
Front	⅛-inch O-ring
Rear	1½-inch rubber slicks
ELECTRICAL:	
Motor	None
Speed Controller	None
Bearing Type	Ball bearings
ACCELERATION:	See chart
OPTIONS AS TESTED:	
• Black Magic 5001 drag motor • Robart 505 speed control • Futaba Magnum Jr. radio system	
COMMENTS:	
Light with easy set-up; gives the consumer a great competitor from run number one. There's no doubt that the Firefox II is the unfair advantage in drag racing. The E.T. and top speeds tell the story.	

FIREFOX II



WHY THE HQ 505?

The new ROBART HQ 505 Electronic Throttle has been designed to provide electric powered Radio Control enthusiasts the utmost in advanced electronic throttling for R/C cars, trucks, dragsters and R/C gliders using folding props.

The HQ 505 Electronic Throttle is an advanced proportional speed control with proportional brake and high speed and neutral adjustments. It is optically coupled for glitch-free radio operation, weighs less than 1.9 ounces, and has an efficiency rating of better than 98% which means it delivers more power to your motor.

Unlike the "other guys" who make unbelievable performance claims about their controllers which are limited to a mere 10 volts of input power, the ROBART HQ 505 can handle from 7.2 volt (6-cell) up to 35 volt (24-cell) battery packs and all the amperage those packs can deliver! And, the HQ 505 does it without fuses! Each HQ 505 is equipped with a Futaba "J" receiver connector and a Tamiya type battery connector.

All ROBART HQ Electronic Throttles are backed by our exclusive limited lifetime warranty. So whether you're driving off-road, on road, truck-pulling, drag racing or just cruising around, you owe it to yourself to check out the new electronic throttles that leave the others smokin'! ROBART HQ Electronic Throttles are available from your favorite Radio Control hobby supplier now. If not, write ROBART today for information.

HQ 505 SPECIFICATIONS:

Type:	Advanced Mostel Technology
Voltage:	7.2-35 Volts DC
Amperage Capacity:	Up to 120 Amps
Size:	1.25 x 2.25 x .625 inches
Weight:	1.9 ounces
Power Dissipation:	600-1000 watts
Voltage Drop:	.07 @ 10 Amps
Optically Coupled	
Adjustable Neutral, High Speed and Proportional Brake	

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robart

P.O. Box 1247, St. Charles, IL 60174

performance through the 54-tooth spur gear, which comes with the kit.

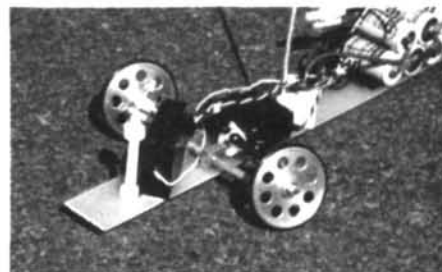
The front steering assembly is also easy, consisting of an aluminum axle and hold-downs, spring-loaded steering arms and king-pin assembly, along with bearing-equipped front rims of bicycle-type design and O-ring tires. One cautionary note: When setting and tightening the front axle, don't over-tighten the axle screws, because they're threaded into aluminum blocks and could easily strip if you try to strong-arm them.

The Firefox II can be purchased with your choice of tires: foam for drag racing on carpet, or rubber slicks for racing on asphalt. Regardless of your tire choice, ensure that the tires are fastened to the rims with an adhesive. One of the most useful methods I've found (and a method that the manufacturer also recommends) is to use 3M Weatherstrip adhesive, which can be purchased at any good hardware store or auto-parts store. This 3M adhesive is strong, but it is still easy to remove the tires when the need arises—and the need *will* arise, because of the power and speed that the Firefox II displays.

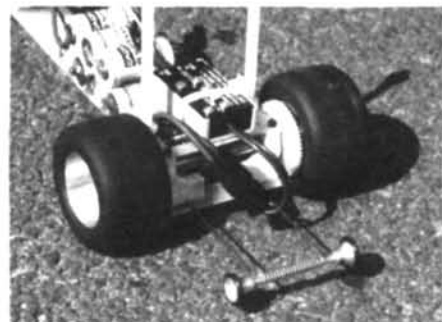
The electrics for the Firefox should be laid out with weight distribution in mind. Don't load too much weight to the rear of the chassis, or you'll be putting the kit's wheelie bars to a lot of use. If you load too much weight up front in the car, you won't be able to get the good traction needed to set a record. Install the steering servo just behind the front axle, and place your radio receiver in front of the axle. The speed control can be installed just behind the steering servo or on the rear deck (as I did). The latter allows you to place the batteries as close to the center of the chassis as possible.

The Firefox II test car was the basic rolling-chassis kit in which I installed my choice of motor, batteries and speed control. I chose a No. 5001 Black Magic motor from R/C Research Engineering*. This drag motor is available as one of the optional motors from Fine Design, and it's a strong 7- to 14-cell performer in a 1/10-scale funny car or top-fuel dragster. There were two types of batteries: a set of seven

matched sub-C cells from Trinity* and a set of 14 matched N-cells from Sanyo*. The speed control of choice was the HQ 505 from Robart*, which employs fully proportional throttle and brake. For this test, the brake portion of the speed control was only set at about 10 percent to prevent any locking up or loss of stability during shut-down. Just make sure that if you dial out all or almost all of your car's breaking power, you have a large shut-down area to prevent any



Aluminum front axle and scale-like front rims and tires add to the excitement.



For asphalt racing, rubber slicks and wheelie bars allow for great hook-up and top performance.

damage occurring if the car runs out of running room.

On the day of the track test, the conditions were great, with only a very slight crosswind. The track's surface temperature was cool, which meant that tire warming would be necessary. This was easily done by placing a small amount of water on the pre-staging area and holding the rear of the Firefox up so that the tires were just touching the wet asphalt, and then doing a combination throttle check and tire heat-up. Equipped with a 7-cell pack, the Firefox was put through a five-run test and then the same number of runs with a 14-N-cell setup. The initial runs showed that the

(Continued on page 90)



Home-Grown Project

IT'S OFTEN SAID that necessity is the mother of invention, and this project certainly illustrates this. With a good friend's best car out of action (due to an argument with a wall during first-round qualifying for a major race), repair parts six weeks away by mail order and second-round heats coming the next week, we had to come up with a car in a hurry. Those of you who've been reading *RCCA* for a while might recall my earlier articles on "Spare Parts Stockers." These stockers were built on chassis made of aircraft plywood. While they did have some good qualities, there was no way they'd stand up to intense competition—these people played *rough*! The fender-bumping free-for-alls seen at several Winston Cup races last season were nothing when compared to the action at *this* club's track! R/C stock-car racing has definitely become a contact sport!

With survival a prime consideration, it was obvious that the car would have to be strong and reliable. Many of the cars being raced at the track were the latest (often high-tech) examples of the leading manufacturers' pavement/carpet machines, but parts like wheels and axles were still being damaged. These factors, as well as the rules



VON ERICH'S

DUSTER 540

by ERIC GOLDSCHRAFE

**Build your own
1/10-scale carpet
racer and save!**

and a maximum target weight of 3 pounds, were the design parameters to be considered. I wanted the car to be competitive as well, and we weren't disappointed.

The primary element of this car,

the chassis plate, is a hunk of epoxy/fiberglass board (the same stuff used to make electronic printed-circuit boards for radios or computers). I used a surplus piece of 3/32-inch-thick MIL-SPEC G-10 board, which is probably the strongest type available, but also rather heavy. I'd noticed that some of the other cars had large areas of their chassis cut away to save weight, but this seemed to leave the wheels, axles, and, in some cases, the steering gear and R/C equipment somewhat exposed and therefore

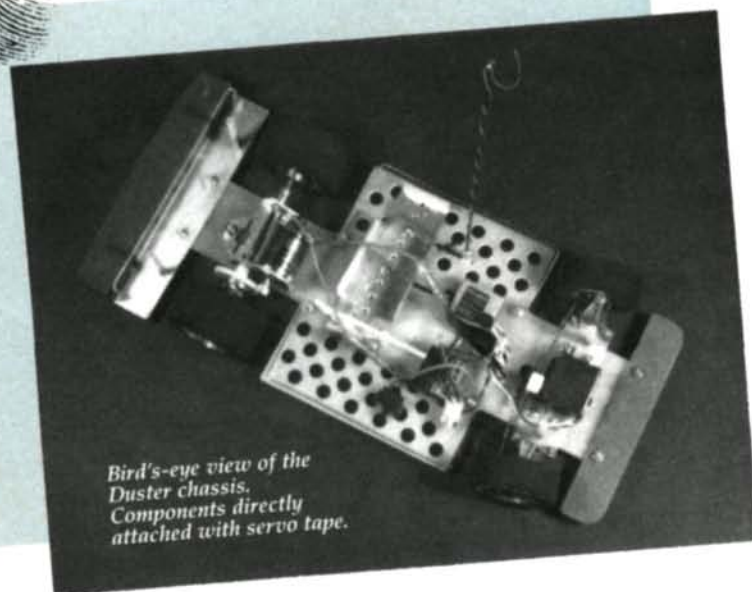


vulnerable. I elected to maintain a full-perimeter design, and to lighten the chassis with holes. These holes were drilled in a pattern that wouldn't weaken the chassis or add a lot of unwanted flexing, and they actually did reduce weight considerably. The prototype car utilized some leftover parts from an early Tamiya $\frac{1}{12}$ -scale on-road car, but as these parts are becoming difficult to find, I've shown the running gear from an Associated* RC 12i in their place. The two small plates

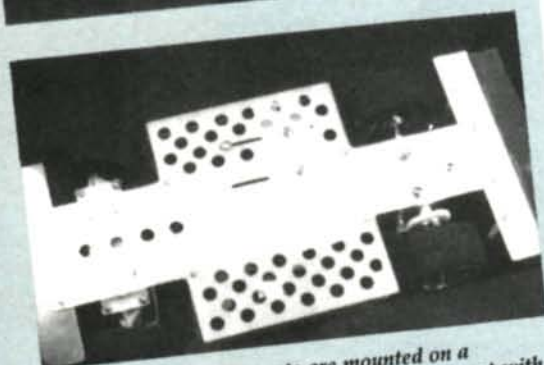
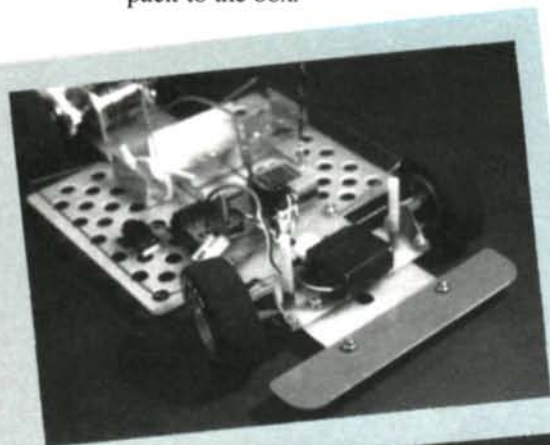
that mount these parts to the main chassis are designed so that many other types and styles of $\frac{1}{10}$ - or $\frac{1}{12}$ -scale on-road components may be successfully used. Note that these two plates are of a thinner grade of epoxy board ($\frac{1}{16}$ inch) to allow for a little flexing. This car ran on a carpeted track, so suspension really wasn't necessary, but its ability to absorb some road vibration makes this design suitable for use on concrete or asphalt tracks.

In this design, the adjustable battery box is the key to balance and handling. The row of holes in the base interfaces with the slots in the chassis plate, and this allows for fore-and-aft and side-to-side placement of the relatively heavy battery pack. Sharp-eyed readers will notice that the plan shows three slots in the chassis, while the photos show only two. The original car was designed exclusively for oval-track racing, where left-side weight bias is normal, and some adjustment was provided to

Home-Grown Project



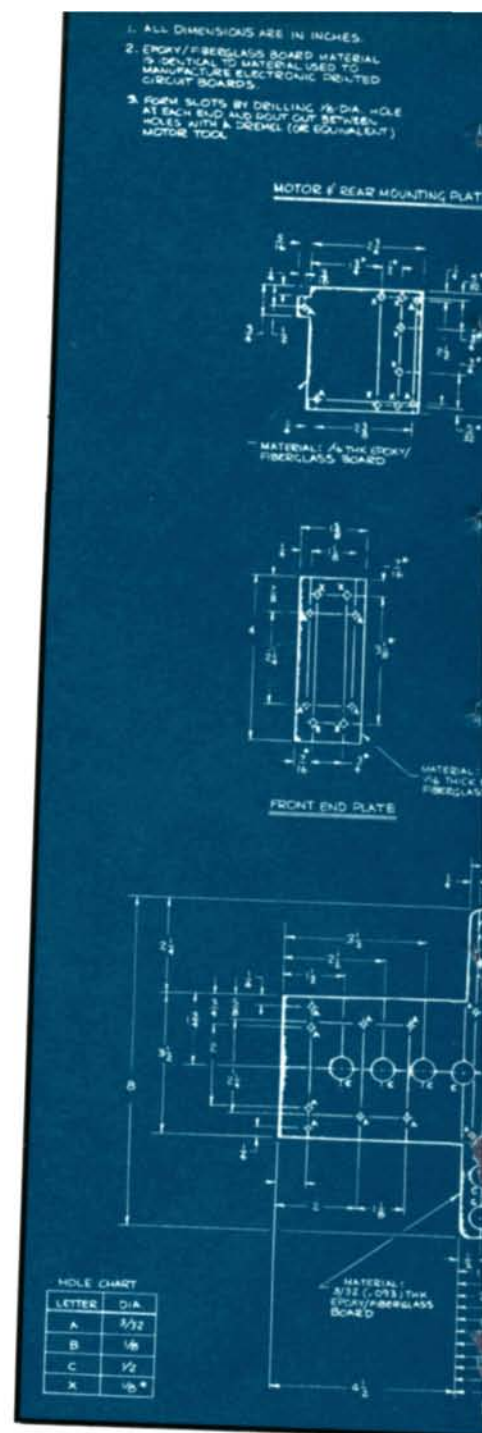
compensate for the expected bias. The final design (shown on the plans) utilizes three slots, so that the box may be easily centered side-to-side for road racing, or moved way over to the left for oval-track events. This battery box was punched out of hard $\frac{1}{32}$ -inch-thick, grade 5052-H32 aluminum; it must be of a hard material so that the sides won't unbend in a bad wreck. If you can't find this grade of material, you can use $\frac{1}{16}$ -inch-thick aluminum at a slight weight penalty. (You could always put in some extra holes to lighten it.) Just make sure that the battery fits in tightly, but not so tightly that the aluminum will chafe through the shrink-wrap or the lead-wire insulation. Tape, rubber bands, or nylon tie-wraps may be used to secure the battery pack to the box.



Top: Front-end components are mounted on a separate plate, allowing some caster adjustment with the use of shims. Above: View from the bottom clearly shows lightning holes and clean undersides.

This adjustable battery pack isn't the only unique feature on the Duster 540—check out the rear bumper! I'd watched several people pop one of their competitors in the rear end, so causing a spinout (often into a corner where the no-reverse speed-control rule got him stuck until a corner marshal could release him). The Duster 540 uses an aluminum "bumper" inside and well clear of the Lexan body, with a fair amount of packing-foam material filling the void. This foam has to be trimmed to fit the body you're going to use (mine is a 1988 Pontiac Grand Prix body from McAllister Racing*), and it's secured to the aluminum with silicone sealer. The intent was to absorb the shock of another car running into the back of my car, and the results were somewhat humorous. Instead of spinning out the Duster 540, the

other car seemed to get stuck in the depression in the Lexan until the sponge rubber returned to shape, giving the impression that the other car was "drafting." Occasionally, the rear car spun itself out. To protect the sides and, most important, the wheels and tires, a pair of rubber-covered spring-wire side-bars are located just inside the body sides, about half way up the doors. This prevents the body from being pushed in over the chassis when (or if!) you get T-boned by another car, and it should help to protect the running gear from damage. Several front-bumper configurations



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VON ERICH'S

DUSTER 540

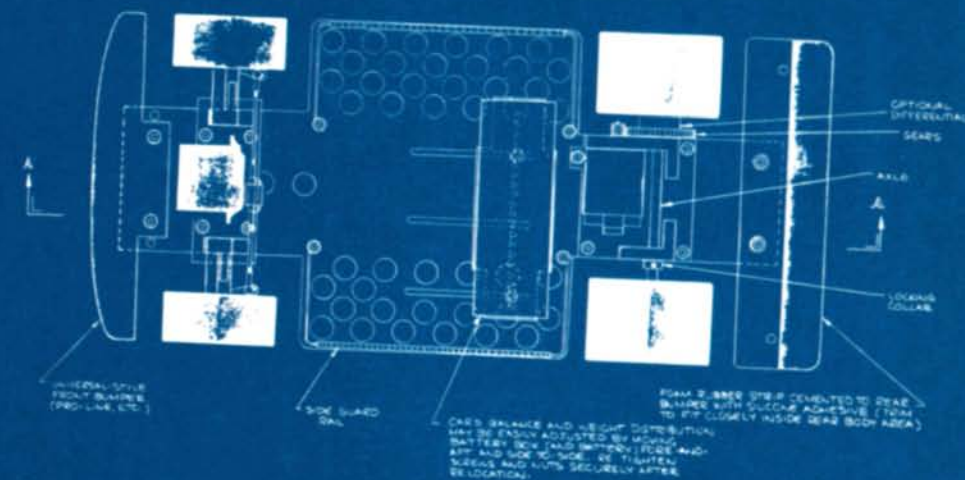
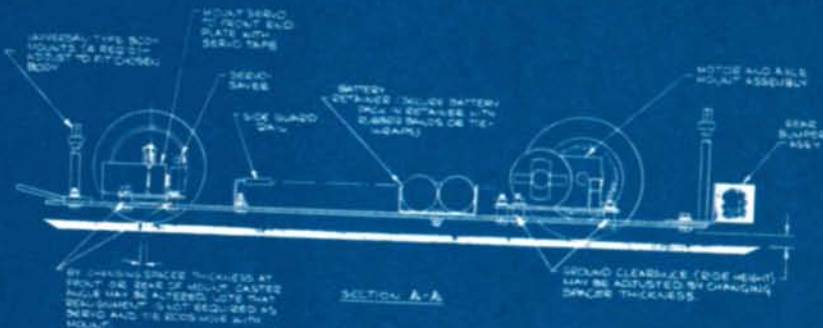
1/10TH SCALE CARPET OR PAVEMENT
OVAL OR ROAD COURSE
RADIO-CONTROLLED RACING CAR

WEIGHT: LESS THAN 3 LBS

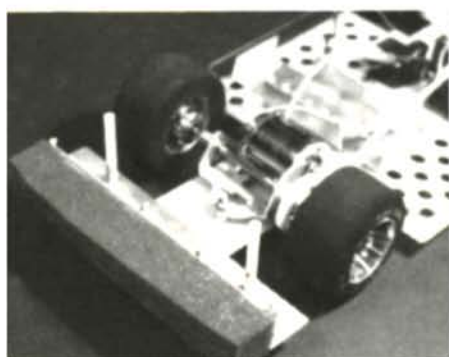
- EPOXY/FIBERGLASS BOARD & ALUMINUM CONSTRUCTION
- USES RUNNING HARDWARE FROM MOST 1/10TH & 1/8TH SCALE CARS (ASSOCIATED SCALE COMPONENTS SHOWN)
- PLAN IS FULL SCALE. DRAWINGS MAY BE USED FOR TEMPLATES

NOTES (CONTINUED):

1. ALL PARTS TO BE FASTENED WITH UNFINISHED SCREWS OR APPROPRIATE BRUSHES, FLAT WASHERS, LOCK WASHERS, AND HEX NUTS. FOR A HOLE USE NO. 6-32 HARDWARE. FOR A HOLE USE NO. 8-32 HARDWARE. THE USE OF THIN LOCKWASHERS IS RECOMMENDED (LOCATED).
2. AT HOLES SHOW LOCATIONS FOR MOUNTING SMALL COMPONENTS OTHER THAN BUSH AND DEAR END ASSEMBLIES. ALL REQUIRE SLIGHTLY DIFFERENT MOUNTING HOLES AND OR LOCATIONS. HOWEVER, BASIC FRONT AND REAR PLATES WOULD STILL BE APPLICABLE.



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Although very simple, the foam bumper on the rear of the Duster proved to be very light and effective.

ORDER THE FULL-SIZE PLAN



July '88 Duster "540" \$9.95

Get in on 1/10-scale carpet or on-road action inexpensively with this plan of Eric "Von" Goldschrafe's Duster "540." This car weighs less than 3 pounds and is constructed of epoxy/fiberglass board and aluminum. Almost any running gear and suspension left over from junk 1/12-scale and 1/10-scale cars can be used. Full-size templates make cutting out the chassis easy.

were tested in competition, but the best solution utilized the universal bumper made by Pro-Line*. I've seen several other ready-to-use models that will fit the bill, but the most important criterion is a close fit inside the front end of your body. This ensures that the car will bounce clear of a wall or another car, so getting you back in the race with as little delay as possible.

There was no magic formula involved here, and we did encounter a few problems (mostly with parts I *didn't* make), but by the third time out, the Duster 540 was running

(Continued on page 88)

THE EDITORS OF
RADIO CONTROL
CAR ACTION
CALL EM' AS
THEY SEE EM'!

by STAFF



OBVIOUSLY, we all want the best for our money, but deciding on "the best" is often a highly subjective matter. In spite of this, we're constantly asked in our daily deluge of letters, "Which is the best?" Full-scale magazines answer this type of reader question, so why shouldn't we? In many categories, the call was a close one, but sometimes we have to stick our necks out, so here we go.

Here at *RCCA* we used many criteria to select the 1/10-scale "10 best." At first, you might think that performance on the circuit would determine our ultimate choice, and that factor did play an important role in the voting, but there are very many other factors to be considered, all of

which will affect you, the reader/consumer. One of these factors is availability of both the car and its spare parts. Even if Company X makes the fastest, best-handling car, it's of no use to you if you can't get one. If you can't get a lower A-arm to replace the broken one on a fantastic car, the car is nothing more than a pile of parts, which sit in the corner and collect dust.

Other factors that were considered were longevity of a design, cost effectiveness, and availability of after-market parts. The list of high-performance parts for some cars seems almost endless.

So here they are, *Radio Control Car Action's* 10 best choices for 1988. ■



2WD ENTRY-LEVEL RAIDER



Choosing the Kyosho* Raider as the 2WD entry-level Car of the Year was an easy decision. The Raider doesn't have a revolutionary design that gives it a superior performance, but it does feature the same suspension geometry that has made some of the top cars so successful in competitive racing. Instead of having to buy a second car, the Raider allows the beginner to pick up a car at a low price, and still be competitive while moving through the ranks.

The Raider will accept a set of oil-filled shocks in the rear, with the use of extra mounting holes on the suspension arms and outside upper mounting holes. The front suspension can also be changed to oil dampening with a horizontal mono-shock or upright oil shocks. The motor placement is mid-ship for better weight distribution, and it will accept any 540-type motor as a replacement. The wheels included with the Raider are adequate, but the wheels from the Ultima (with low-profile tires) will also fit the Raider and improve its performance. Unlike other entry-level cars, the Raider is capable of using many factory and after-market parts (e.g., high-performance motors) to enhance its performance.

**For more information, contact Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*

2WD READY-TO-RUN ENTRY-LEVEL TRAXXAS CAT



Some people think that ready-to-run entry-level cars do the hobby a disservice because, if something breaks, the user won't know how to fix it since he didn't build it. However, if he's "hooked" on R/C, he'll figure it out or seek help. Furthermore, if an individual can instantly become a fanatic with a pre-built car, he'll be more than mentally prepared to jump to a kit for his next car.

Our choice in the entry-level ready-to-run category is the Traxxas* Cat. The front suspension is a time-proven trailing-arm type which, unlike a single-arm setup, doesn't have the problem of camber changes while under severe compression. The trailing arms of the Cat are supported by a thick steel rod that passes through the width of the chassis, making a very tough front end. The rear live axle pivots on a ball and socket, and this allows the bumps to be absorbed by both spring and shocks setups instead of just by one side, even if the bump only hits one tire. The Cat's rear suspension is almost entirely devoid of side-twist, as viewed from the top, unlike some other cars that use the ball-and-socket setup.

An entry-level car, whether assembled or not, generally suffers in the shock department. The Cat's shocks are four-way adjustable oil-filled units instead of friction types. Incidentally, RC 10 shocks will fit the Cat, and will increase suspension travel.

Unlike many cars in its class, the Cat uses ball-links on the steering rods, instead of slop-producing Z-bends. It also uses a three-step forward-and-reverse Tamiya-type resistor speed controller, which has proven to be reliable.

We all loved the fact that the Cat has a radio that can be removed and used in other cars, and not an integrated PC board that's married to the chassis. Put simply, we think the Cat is a lot of car for an approximate selling price of \$135.

**For more information, contact Traxxas, 12150 Shiloh Rd., Dallas, TX 75228.*

2WD OFF-ROAD RC 10



This category was the toughest call of all. As we all know, there are several great 2WD cars to be considered—one in particular. However, they are just too new for their full potential to be realized as yet.

To help reach a decision, we had to consider a very important matter: after-market support. Because the proven design of the RC 10 has been around for so long, there are probably more "goodies" available for this car than any other. And what about conversions? Whether it's a sprint car, on-road or dirt-oval car, there are many conversion kits available for the RC 10. Advance Engineering even makes an Indy car conversion that we'll be featuring soon.

The Ultima is gaining ground in this department, but the final outcome is yet to be realized, as the car is just too new at this point.

The RC 10 has shown the way in many respects. For example, many cars have borrowed features of its design and suspension geometry.

The future may hold some drastic technological changes, not only in 2WD, but in all forms of racing. But for now, if a supportable, proven, highly competitive 2WD off-roader is what you're after, the nod has to go to the dependable RC 10.

**For more information, contact Associated Electric Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.*

4WD OFF-ROAD OPTIMA MID



4WD READY-TO-RUN ENTRY-LEVEL TORNADO



In the April '87 issue of *RCCA* we tested the Monogram* 1/10-scale Tornado. We had two samples, a red one and a yellow one. They are both still running, with front left upper and lower A-arms on the red one and new speed-controller resistors on the yellow one being the only new parts needed since we reviewed it in April '87. Bear in mind that these cars are in the cruel hands of a twelve-year-old and a thirteen-year-old!

The Tornado features a shaft drive with planetary gear differentials, upper and lower A-arms all the way around and good-quality plastic (which doesn't strip the first time you disassemble the car for repairs) throughout.

The shocks are friction-dampened and the springs are mushy, but they're easily replaced with after-market types, such as the Option House Gold shocks. The car was surprisingly fast with the Mabuchi 540, but we wouldn't recommend anything hotter than a good stock wind.

The Tornado has an integrated radio. We prefer a discrete unit but still like the car because ours held up so well, and it was easy to control due to a predictable amount of understeer.

The Monogram Tornado does its job—it gets the newcomers' interest and keeps it. Add a stock motor and oil-filled coil-overs, and the Tornado starts living up to its name. There's a lot of mileage to be had from this ready-to-run entry-level car.

*For more information, contact Monogram Models Inc., 8601 Waukegan Rd., Morton Grove, IL 60053.

The new flagship of the Kyosho* competition 4WD cars is the Optima Mid. This car is the result of years of testing and racing with the original Optima. New to the Optima Mid are: a mid-engine motor-mounting position, which evens out the weight distribution; a set of four Option House Gold shocks, which are a considerable improvement over the standard Optima hardware; and a metal-reinforced belt-drive system for smoother power delivery. The kit also includes the powerful Kyosho LeMans 240ST motor, and although this motor hasn't brought Kyosho any notable victories, it *does* provide the R/C car enthusiast with plenty of get-up-and-go for modified-class racing. The kit itself brought home five of the top 10 places at the IFMAR World Championships last year, which is testament to the Mid's performance potential.

During testing we encountered a problem with the kit's three-step speed controller. The original speed controller in not only the Optima Mid, but in all Kyosho cars, has had problems with burn-out. This was compounded by using the LeMans 240ST motor. According to Kyosho, this is no longer a problem, as they designed a new speed controller for all their cars.

There's one other factor which convinced us that the Optima Mid should be Car of the Year: the abundance of support equipment available for all-out competition. Through Option House, a racer can purchase a number of performance accessories, such as ball differentials, heavy-duty Platinum shocks, composite chassis, turnbuckles, etc. With all of this at the fingertips of the consumer, it's not hard to see why this is the 4WD Car of the Year!

*For more information, contact Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

4WD ENTRY-LEVEL BOOMERANG



The Tamiya* Boomerang is a shaft-drive lightweight 4WD car kit that's a great choice for the first-timer who prefers to start with a 4WD car. The main reasons for our selection of the Boomerang are price (between \$130 and \$140), uncomplicated design and easy assembly. If you look at the high-tech, expensive, winning cars, they too, are studies in simplicity. The difference is in the materials: The high-ticket cars are of composite and aluminum, while the Boomerang is of plastic. Plastic isn't necessarily bad; Tamiya uses a good grade of high-impact ABS resin plastic. The Boomerang also has upper and lower A-arms, as well as oil-filled coil-overs all around.

We receive many letters at *RCCA*, often with complaints about products. If we don't hear about a product, we presume a high degree of consumer satisfaction. On the other hand, some readers are so pleased with their cars that they write to tell us about it, and hope that we tell others. We've received many such letters about the Boomerang, and some readers claim that they've "blown off" more expensive cars with the less expensive Boomerang. We'll never know if these racers were just bragging, or if, in fact, they *did* triumph over the "superior" car. The fact remains: These are satisfied consumers.

If you want a low-cost 4WD car, the Boomerang is a good choice. It's been around for years—that must mean something!

*For more information, contact MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.



2WD TRUCK BLACKFOOT



The Blackfoot is the first 2WD from the Tamiya* line of monster trucks. Its chassis is derived from the durable Frog 1/10-scale car, and it's also the base for the Monster Beetle chassis. This truck can tow boats, trailers and cars, and it runs on every type of racing surface—from the back yard to the racetrack. The appeal of the Blackfoot is that its parts are interchangeable with many of the Frog's replacement and after-market parts. These parts (along with those designed specifically for the Blackfoot) ensure that, whatever your intentions, there will be a parts pipeline as near as your local R/C hobby shop to support your efforts.

As a monster racing machine, the Blackfoot is at the front of the pack, with a relatively low overall weight, a durable chassis, and, as shown by our Monster Truck Shootout, the highest top speed and fastest acceleration of any monster truck. Its drawbacks are the weak dog bones and differential, but the wide variety of available parts will soon make this problem a memory.

Availability was a main consideration when choosing the 10 best, and with so many excellent trucks on the market, Tamiya's ability to keep filling the orders for their product certainly carries a lot of weight.

**For more information, contact MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.*

4WD TRUCK CLOD BUSTER



The latest rage to hit the R/C market is the wild monster truck. As an alternative to the bump-and-grind of car racing, these trucks offer the R/C car enthusiast a vehicle that dares to go where no car has gone before. With a set of super-huge tires, heavy-duty frame and some serious ground clearance, most monster trucks can run in mud, sand, snow, rocks and places that would defeat an R/C car.

Choosing the best monster truck was one of our easiest decisions. The Clod Buster from Tamiya* almost parallels some of today's more popular full-scale monster trucks but in 1/10 scale. Excluding its healthy price tag, the Clod Buster represents everything desirable in an R/C monster truck. It's the biggest, standing over 13 inches high with 6 1/4-inch Terra tires. There's pulling power to spare with the dual 540 motors and, amazingly enough, this 9 1/2-pound monster moves along at a pretty good clip! It's one of only two R/C monsters with four-wheel steering, and the *only* one that's capable of doing it with a 2-channel radio.

Another factor that figured in our choice was availability. We've heard of hobby shops having to wait a while to fill all the orders for the Clod Buster, but that's to be expected with such a hot new product. When the initial onslaught is over and the orders have been filled, a large manufacturer such as Tamiya should have no problem getting the Clod Buster to all you heavy-metal maniacs!

**For more information, contact MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.*

DRAGSTER FIREFOX



Choosing a 1/10-scale electric dragster was one of our toughest decisions, and we limited our choices to those we've tested. These cars aren't very complicated, and the difference between kits is very slight. However, sight unseen is not the basis for an equitable decision.

As most of you know, to win in drag racing, you have to cross the finish line first. With electric dragsters, there are a number of factors that determine how quickly your car will do this. As with most other dragster kits, a motor, a speed control, batteries and a radio system are required. This doesn't leave a lot of the performance dependent on the kit itself. Aside from being durable and easy to assemble, low weight is the single most important asset. The lighter the chassis, the faster the motor will be able to push it to the end of the dragstrip.

The tires on the Firefox are rubber instead of foam rubber. They haven't been tested much for traction, but the method used to mount them certainly gives the Firefox a distinct advantage. Only the outside of the hollow rubber tire is secured to the wheel, allowing the tires to "grow." Simply, as the car gets up to speed, centrifugal force causes the diameter of the tires to increase and enables the car to go much faster.

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Because 1/10-scale on-road racing is still in its early stages, there are many new manufacturers who are now jumping on the bandwagon with some outstanding 1/10-scale cars. But, rest assured, a look at the top ten in any given event will include the Predator.

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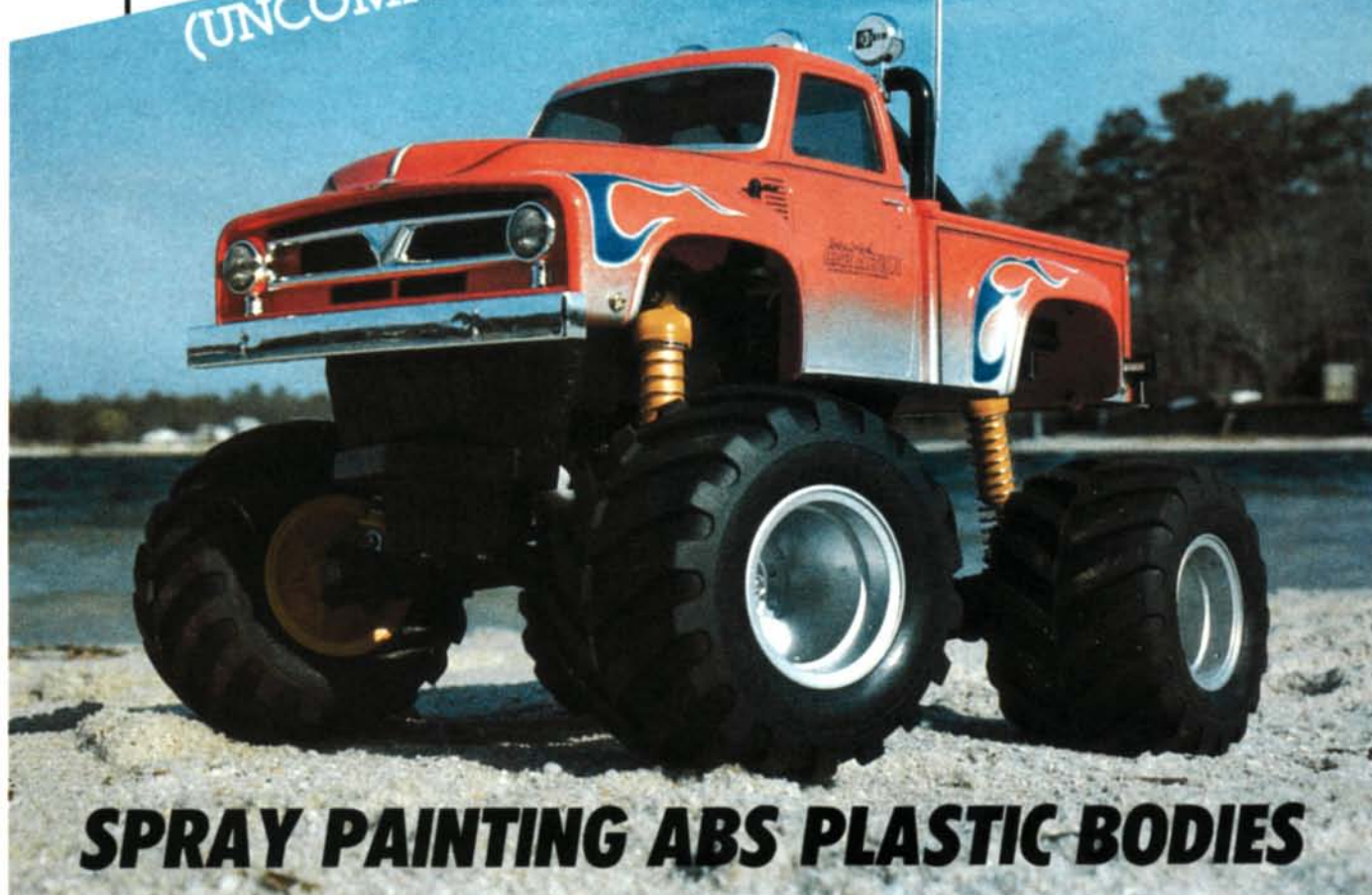
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MANY OF THE MACHINES you've seen on these pages in the past, and a number of actual articles, have featured semi-exotic paint jobs. Both Phil Sroka and I have talked about airbrushing techniques that will turn your plain, undecorated Lexan wonder into something that will turn the heads of your fellow racers every time you show up at the track. We'll continue to bring you the latest painting methods so that you can benefit from our experiences in applying the magic color. "But I don't have an airbrush or compressor!" is a lament we frequently hear, mostly from the younger wheel people or those who are just getting into the hobby.

UFO

(UNCOMPLICATED FINISHING OPERATION)



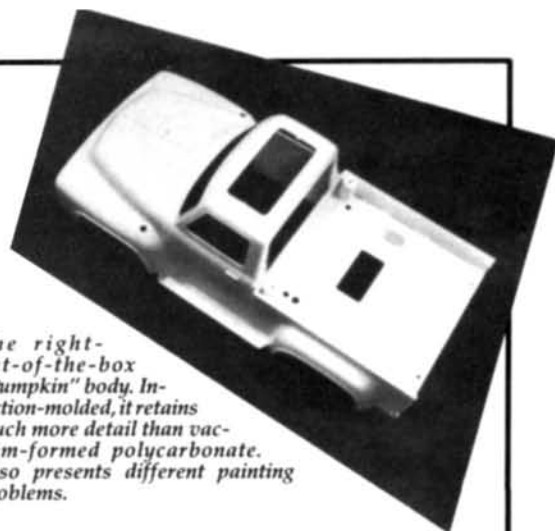
SPRAY PAINTING ABS PLASTIC BODIES

by RICH URAVITCH

While the airbrush still remains the method of choice for applying paint to our models, the equipment purchase may not fit the budget of some of you off-road warriors. Chill out, dudes, King Yura is here with the solution...*spray cans!*

Those of you who were car modelers before you became racers have a little advantage over other newcomers, as you may have already used the spray cans on your models. The question is, were you using them properly and getting the best possible results? Maybe not, and if you weren't, this article will show you some of the best techniques I've found. First, *all* spray paints are *not* created equal. Why? Simple! Those produced specifically for models have much finer nozzles than the standard (and generally larger), hardware-store variety. As a rule, the paint is also a bit thinner, and this allows it to be applied much more smoothly, with less bumpy-surface "orange peel." This isn't a problem when painting Lexan or polycarbonate bodies from the *inside*, because you're looking through the clear body at the color. Even paint applied with a toothbrush *on the inside* would probably look acceptable, but we're talking about painting the injection-molded ABS bodies, where the paint is applied *on the outside*.

The body we chose to paint for this article was the Tamiya* Midnight Pumpkin monster truck. The whole idea was to make the finished machine as sharp-looking as possible, using readily available paint and decorations. The first step in the procedure requires that the body and all parts to be painted be thoroughly washed in warm water and a dishwashing detergent. This also applies to clear bodies. I use an old toothbrush (stealing your sister's is *not* a good idea!) to scrub the body with the soapy water. This removes all the mold-release material that may have been deposited



The right-out-of-the-box "Pumpkin" body. Injection-molded, it retains much more detail than vacuum-formed polycarbonate. Also presents different painting problems.

during manufacture. When you've done this, dry the body completely, and set it aside for additional air-drying while you prepare the paint.

It's important not to touch the body until after the paint has dried, because your skin contains oils which could prevent the paint from sticking properly. Now take an old pot, bowl or container large enough to hold the spray can, and fill it with hot tap water. The water should be *no hotter than it comes from the faucet*. Place the spray can in the water and leave it there for ten minutes or so. This

accomplishes two things: it warms the paint so that it flows out much better, and it increases the pressure of the Freon propellant, which atomizes the paint better and makes the finish smoother.

As an experiment, I used the Pactra* paint formulated for use on Lexan bodies (from the *inside*, remember?) and applied it to the *outside* of the Pumpkin. It sprayed well and dried quickly when applied in *thin* coats. This is very important! We all tend to be eager to complete this phase of the project, because it's just about the last step. Strange, too, because this is *the* step that everyone sees and it's what separates *your* beauty from the one with the runs in the paint and the "sandpaper" finish! Take your time, apply three or four

thin coats and watch that trick finish take shape.

The Pactra paint dries "flat" (with no gloss at all), and this really didn't bother me because I knew I'd be applying some clear top coats after all the detailing had been done and the decals had been added. If you don't want to do this extra step, choose gloss-finish spray paint for your machine.

(Continued on page 70)



Above: Pactra painting materials; spray cans, brush-on and paint sticks. They're all you need. Below: Spray can immersed in a bowl of tap water. Improves flow of paint on body surface.



Paint is applied directly from heated spray can in thin coats. Don't be impatient!!



And you thought your car was fast...

MEET THE PLAZMA ROCKET CAR!

THE FINAL COUNTDOWN



An area in front of Slot And Wing Hobbies is where Dave McNattin races his awesome rocket-powered car.

by DAVE McNATTIN

THE LATEST DEVELOPMENT in R/C cars? Rocket power!—spelled with an R for “real” and a P for “punch”! You may have seen or heard of the fast fire-breathing rail-type dragsters that are

appearing around the country. These beautiful scale monsters show impressive engineering and craftsmanship.

If you lack the patience or machining skills that are required to build a wagon, relax. There's no need to enlist the local machine shop or to buy a magnifying glass. Here's the brainchild of one of our local hobbyists, Jim Watson. I've modified some of his ideas and I hope you can adapt these plans to fit your needs. Just dig around on the ole workbench and see what you can come up with; I'm sure you'll find the start of something quick and easy... Right under that stack of old *RCCA* magazines... One slightly used 1/12-scale

FINAL COUNTDOWN



The parachute attachment was moved to the left module mounting bolt with no problem. Fiberglass was used to reinforce the bracket and motor stop extending from the end of the motor tube.

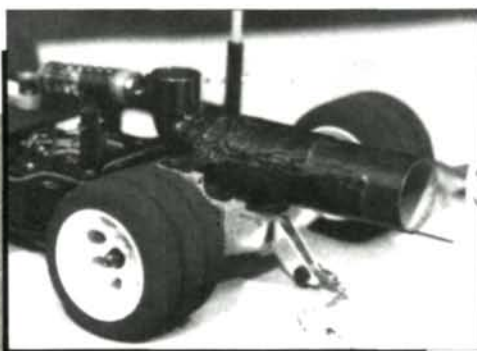
car (in my case, a quick little Kyosho* Plazma). With some brass plate and a couple of copper plumbing fittings, we have a good start, so let's get building. I used the Kyosho Plazma because it's a very light, yet durable, car, but use what you have available. These

modifications provide a general guideline, but feel free to experiment. Remember, keep it light and build it straight.

CONSTRUCTION: To keep the thrust line as close to the axle as possible, I inverted the rear-frame cross member. This also enabled

me to use a sleek Kyosho BMW-M1C body. The power unit is a very simple module that can be easily installed or removed without permanently altering the car. Since one of my objectives was to maintain a very smooth body surface, I decided to make my motor-chute tube removable. This allowed the body to be attached without cutting away half of the

car's rear to clear the chute tube. Making the chute tube removable means that there must be a snug fit so that the chute will deploy properly. To simplify your installation, you may wish to permanently attach the two sections. If so, remember to clean both pieces of copper with emery cloth or with a fine sandpaper. Apply flux to both pieces, then insert one elbow into the other, making sure that the two are properly aligned. Use a propane torch to heat them, and after heating apply 50/50 solder to the joint. The solder will flow evenly around the joint. When the elbows are cool, they should be washed to remove any excess flux residue. To mount the



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As any rocket enthusiast will tell you, an occasional unscheduled flight is to be expected, as our author soon found out with this early departure under the street lights.

MATERIALS

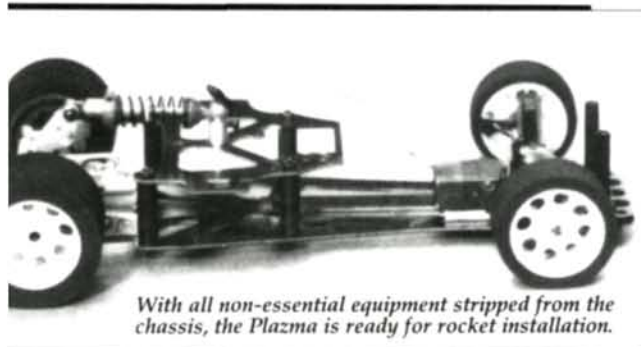
- 7-inch rocket motor tube (1-inch i.d.)
- 2 copper elbows (1/2-inch i.d.)
- 1 piece brass plate (3x1/2x.047 inches)
- 3 pieces fiberglass cloth (2x3 inches)
- 1 motor clip (2 3/4 inch)
- 2 Allen headscrews and washers (4-40x1/2 inch)
- 1 washer (1/4x1/2 inch)
- 1 package Estes motors and igniters (D12-3)
- 1 slightly used 1/12-scale electric car
- 1 set nerves of steel

Plazma's mono shock, I added a small bracket to the front of the lower elbow. This was intended to reduce chassis flex under acceleration, but I'm not sure that it was necessary. Experiment; that's the name of the game.

I bought the motor tube at a local hobby shop. The tube is simply a rolled piece of heavy paper with a one-

inch i.d. To make the chute tube, cut a piece of this tubing approximately 3 3/4 inches long. Cut another tube 2 3/4 inches long for the motor housing. The remaining tube should be used to form a reducing shim, to help fit the motor and the chute tubes to the copper fittings. Press the respective tubes and elbows together so that they overlap about 3/8 of an inch, and then epoxy them.

I also bought a motor retention clip. This clip is the same length as a rocket motor, and it prevents the motor from moving during the propulsion or retro-fire stages. If the manufactured clip isn't available, you can make your own from piano wire. Position the retention clip on the tube so that the rearward stop is 3/8 of an inch beyond the end of the tube. Cut a small slot in the tube to allow the forward stop to penetrate the tube, and tape the clip in place. Then, bend the brass plate to match the radius of the motor tube. Use a small amount of epoxy to attach the mounting bracket to the tube. Cut several



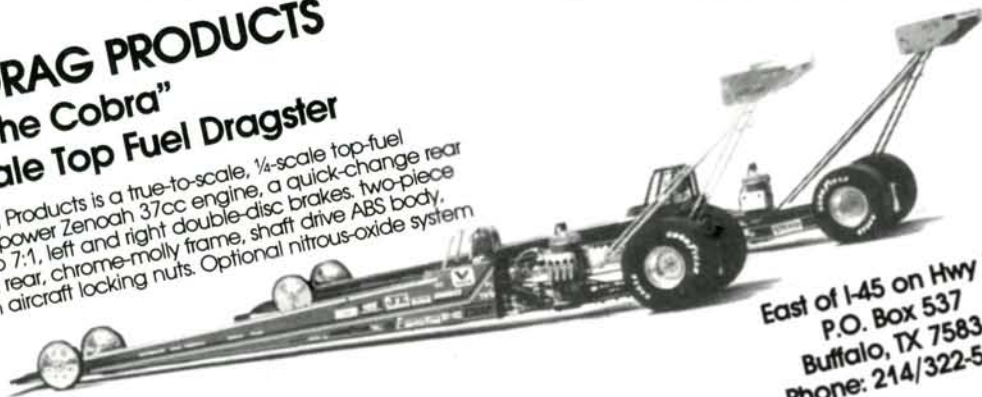
With all non-essential equipment stripped from the chassis, the Plazma is ready for rocket installation.

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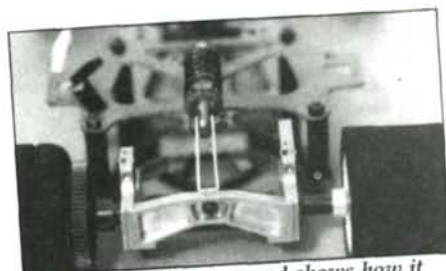
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COUNTDOWN

pieces of 2x3-inch fiberglass cloth, wrap them around the joints of the power module, and work the epoxy through the cloth. This makes an extremely strong joint that can handle the force and high temperature of a rocket blast.

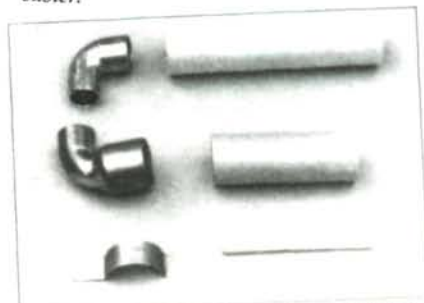
When the pod has cured, place it on the chassis and mark the mounting



This view of the rear pod shows how it looks before installing rocket hardware. Note trued and sanded tire on left and untrued tire on right.



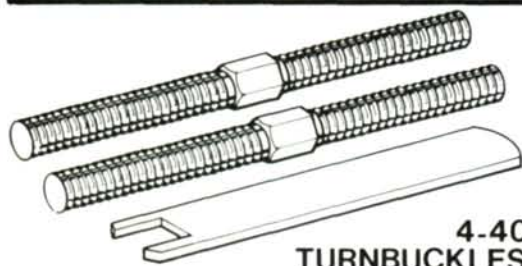
In the absence of a Ni-Cd battery pack, placement of the radio system is a little easier.



Materials used for the motor module are not only easy to find; they are also inexpensive.

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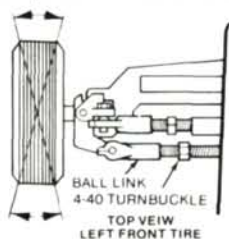


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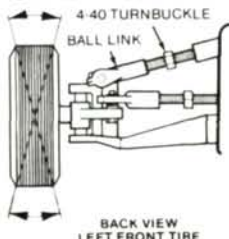
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holes. The Plasma uses a cast-aluminum motor-mounting bracket, which is flat on top. This surface is a convenient place to attach the module. Using a 4-40 tap, tap the two existing small holes on the top of the bracket. Now drill the mounting holes in the pod, using a No. 40 or 3/32 drill bit, provide some adjustment. Special must be taken here to ensure that

(Continued on page 94)

Troubleshooting

by FRED MURPHY

"Running With Time To Spare"

DURING THE PAST FEW months, the "Troubleshooting" mailbox has been flooded with letters, all asking the same question: "Why does my car have a poor running time?" As with most subjects, there are many variables involved in determining running time, and I'll examine some of the *major* ones.

Before going into great detail in any specific area, I'll discuss fundamental ideas about the type of radio-control car or truck you're driving. There are basically four types of cars and trucks on the market today: two- and four-wheel-drive cars and two- and four-wheel-drive trucks. If we logically compare basic drive systems, it's obvious that there are many more moving parts in a 4WD system than in a 2WD system. This, in turn, means that a 4WD vehicle, having more moving parts, will take a larger amount of energy to move. The more energy the car uses, the shorter will be the running time. Energy consumption will also be greater if drive trains aren't free of binding, so ensure that your setup has a friction-free gear movement.

People commonly have misconceptions about what they can expect from their cars. Regardless of conditions, I don't expect to get more than eight to ten minutes running time with any car. Most trucks have a typical run time of six to eight minutes, and some of the high-tech machines that are now available have usual running times of between four and six minutes. Everyone wants performance, power, speed and more running time, but if you want to increase power, speed and performance, guess what's likely to suffer?—Running time.

The first item most R/C fans turn to in search for increased speed or power is the motor. The type of motor you have

will really affect running time. Out to the local hobby dealer you go, saying, "Give me the hottest motor you have." *Wrong!* You go home, do a quick installation and hit the road with about two, perhaps three, minutes of running time. So you pack up your car, head back to the dealer and say, "Something is wrong with this motor. I only got two minutes of running time out of it, and I got ten minutes before." *Wrong again!* You asked for—and got—the hottest, most current-hungry motor in the shop. The big question is, was that the right motor for your car? The motor you bought was probably designed to give you only that amount of running time.

When you bought your first car, I'm sure you spent hours on research before you made your choice. Do the same before deciding on a motor. If you're looking for more torque or low-end speed, expect to sacrifice some running time. In most cases, when the rpm of the

motor is increasing, it doesn't mean that the running time is doing the same. Running time will suffer if you decide to replace the RS-540 motor that your car or truck came with. If you're not sure, ask the hobby-store sales assistant, and if the assistant doesn't know the answer, I'm sure he or she will find out for you. Some motors, like the LeMans series from Kyosho*, indicate running time in the model number. For example, LeMans 240 series vehicles give 240 seconds of running time, which is four minutes. However, you'll only get four minutes if all other parts, e.g., batteries and drive train, are working properly.

The condition of the motor brushes will also affect running time. The majority of motors come already broken in. This means that the brushes are already properly contoured to the commutator, but if you want to ensure a low voltage, do your own break-in. This break-in procedure is



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ROCKBUSTER RC CARS



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Hopped-Up Version - Same basic design as Original Rockbuster but comes with a RS-540 motor, new suspension, bigger tires and hubs. Designed for competition.

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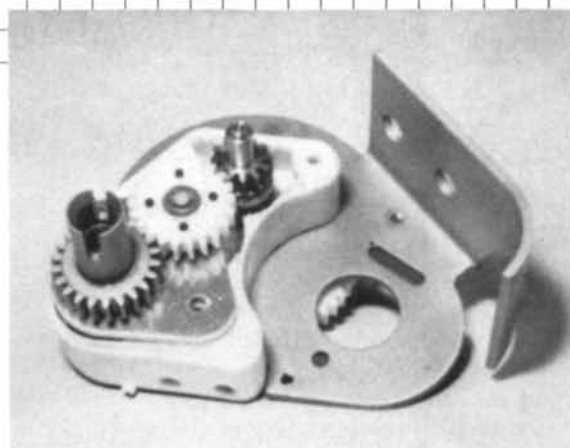
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The RC 10 gearbox provides a fine example of a 2WD differential. An average 4WD differential could have over twice the amount of moving parts as the RC 10. Double the parts; double the energy consumption.



also very important if you are just replacing the brushes. To do this, you can make a power source of three to four volts by taping some D-cell batteries together and letting the motor run for about ten hours. But this can be expensive as, with most motors, two D-cells will last only about one to one-and-a-half hours. The other way to break in your motor is with a motor break-in device from companies like Cobra International*. The Moto-Smooth is a neat, portable unit that will allow you to use your Ni-Cd battery packs to do your break-in safely and will save you the expense of buying D-cell batteries, which are only good for one use. The Moto-Smooth comes with a Tamiya-type connector on the battery-input side and on the motor-connect side. By placing the Cobra unit between your battery pack and the motor that needs to be broken in, the voltage is safely regulated to your break-in needs. At a quarter of the price of similar units, Moto-Smooth is perfect for brush break-in and after-race reconditioning. Cobra's Moto-Smooth will allow you to adjust break-in current from 3.5 volts all the way up to your power source's maximum voltage. The slower and longer your break-in, the more effective it will be; three to four volts for eight to ten hours will be best.

The other major area of running-time reduction is the gearing department. The stock kit comes with a standard gear ratio that is designed to make your car or truck perform its best. If the kit is designed for

off-road racing, then the manufacturer has given you a gear ratio that will make the car use its motor and drive train most effectively. As soon as you change motors or pinion gears, the running time will be affected. In most cases, changing a pinion gear is the easiest way to change the car's performance. By making the pinion gear larger, you'll increase the car's top-end speed, but you might not realize that you'll shorten the car's running time (in most cases, dramatically). If you go to a smaller pinion gear, you might increase the running time, but you'll suffer in the top-speed area. In short, you have to decide what you want more of. Your only alternative is changing the motor to one that will give you the best of both worlds: more performance and speed with as little loss of running time as possible. Sounds simple but, as many of you might already have found out, it's not.

My strongest recommendation is that you should go right to the local dealer at the local racetrack and talk to those who have experience working and racing with the cars and trucks that are most popular in your area. Good luck, and happy motoring!

**Here are the addresses of the companies mentioned in this article:*

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign 61820.

Cobra International, 1235 Lowery Rd, Norfolk, VA 23502.

120 and counting!



Left: Front of body features airplane canopy made into hood scoop mounted through cutout from below. Chrome-foil dots simulate quick-release fasteners on body panels.

Above: A look into the rear shows right-angle drive setup. These gears blew, and were replaced with much bigger and stronger parts from drill accessory. Tow bar hooks into rear-axle pillow blocks, removing strain from chassis.

RETURN OF THE RAT

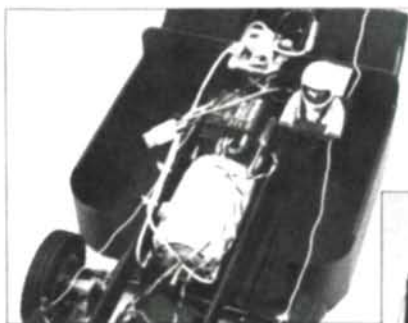
by ERIC GOLDSCHRAFE

READER RESPONSE to our May issue's article, "The Rug Rat," was so overwhelming for the short time that the magazine was on the newsstands, that we now bring you "Rug Rat, Part II"—a closer look. Since we last reported on it, the Rat has successfully hauled 120 pounds. Maybe we should all have one in the trunk of our cars to save on towing bills in case of a breakdown. ■

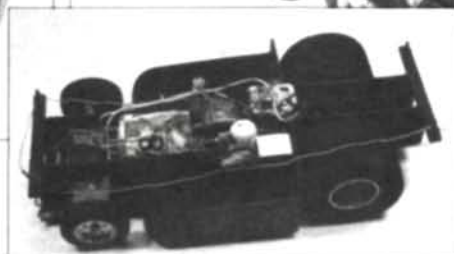
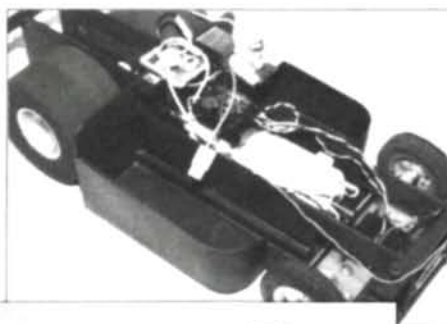


Broad spoiler mounts over rear body-mount pins; uses clips to hold in place.

Overall chassis is evident in this shot. Receiver is servo-taped to the top of the transmission.



Above: Large open bays are for massive amounts of ballast weight. V8 can that usually hides motor is removed.



Left: Another chassis shot with V8 can removed.

Above: Front-end details and Marx Hectaperm GT500 G motor available from Polk's Model Craft Hobbies. Front suspension is old Tamiya 1/12-scale spindle and steering arms.

RACER'S EDGE



HAVE YOU EVER been leading a race, only to be punted off the track because a back marker wouldn't get out of your way? This is a common problem at racetracks all over the country, and the problem is driver etiquette—or the lack of it! I'll give you hints on how I keep my line clean and fast on the racetrack.

The quickest way to get a reputation is to be a "hammer" on the racetrack. If you get a reputation as a "hammer," you're probably an erratic driver who hits every car in your heat at least once before the heat is over. To avoid becoming a "hammer," try to drive without touching or obstructing too many other cars. I know this sounds impossible, but it can be done. To drive a fast race is to drive a smart race.

Let's look at how a qualifying heat should be driven. A qualifier is a race against the clock, so stay as "clean" as possible and don't hit anything—easier said than done, but possible.

- Rule 1: Never let a faster car behind you push you into a mistake. If the car behind is noticeably faster, let him go. If you try to race with him, you'll probably both get in a tangle and slow your times considerably.
- Rule 2: Try not to get tangled up at the start. Never look for the hole shot, unless you're absolutely sure you can make it. Usually, the first car to the corner is the first car put over the boards. Sometimes it's best to hang back a little to see what's

Racing etiquette of a true champion.

by JOEL JOHNSON

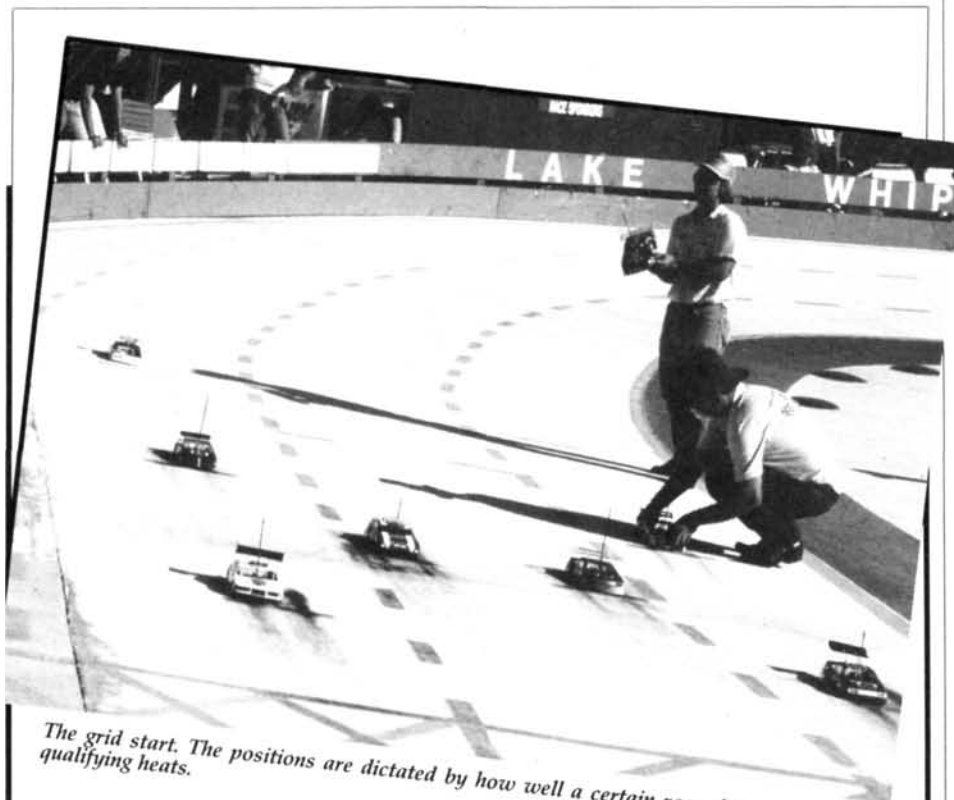


This is what to avoid in the first corner. Be first or else lay back.

going to happen, and then steer your way carefully through the disaster. There will probably be a pile-up at the first corner, and the first-corner tangle always takes longest to sort out, so keep out of trouble at the start.

- Rule 3: In a qualifying race, always let the leader go if he's lapping you. If you obstruct the leader when he's trying to lap, you'll prove that you're a "hammer" and that you don't belong on the track. Letting the leader (or any other car that is lapping you) go past is common driver courtesy and should be the rule rather than the exception! Taking out a car that is lapping you is the easiest way to be the most disliked driver at the track. Remember, this is supposed to be fun! Always think of a qualifying heat as a race against the clock, not against the other seven or eight competing drivers. Keep this in mind, and you'll have a better chance to make the A Main. To qualify first, first you must qualify!

Now, to driving a main event. A main event is very different from a heat race. In a heat race, personal time is the concern. In a main event, it's car against car. It doesn't matter how fast the main event is; whoever crosses the finish line first, wins! Before going into a main event, ask yourself these questions: How fast are my starts? Has the first corner been a problem? Who am I driving against? Where am I sitting on the grid? How good are my batteries? Let's start with the first item. (All these items tie into the start.)



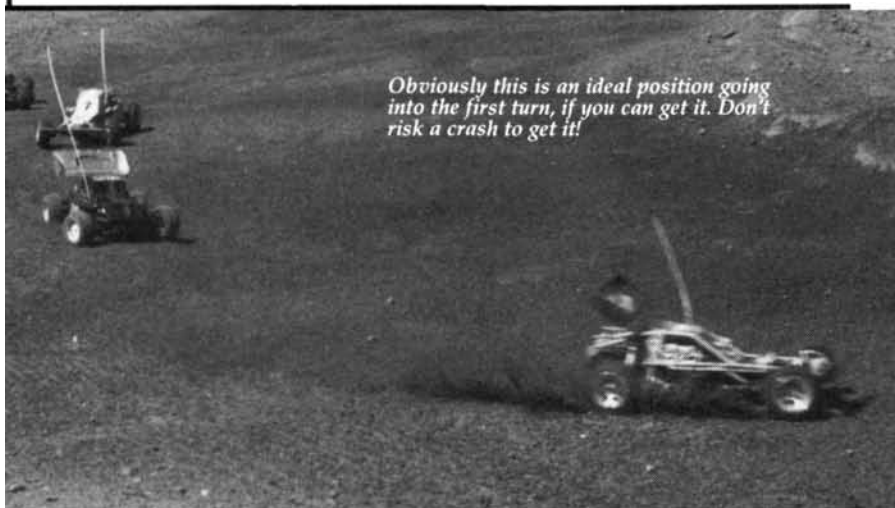
The grid start. The positions are dictated by how well a certain racer has done in the qualifying heats.

Starts

- The grid start. The start in a main event is the most important part of the race. At a grid start, there are usually about three or four rows of cars. It's good to jump to the front at the start, but if you have any doubts or are in any row behind the second, don't expect to be first coming out of the first corner. It's better to have a clean start and be third or fourth coming out of the first corner than to try to get a "hole shot" from the back and so get into a major pileup in the first turn. You've had a successful start if you can get through the first turn without getting hit or stuck. It doesn't matter which place you're in. You have two options at the start: One option is to accelerate quickly from the word "go" and hope for the best, and the other is to hesitate at the start, and then look for a clear path through. If you're on the front row, you can't hesitate at the start, but if you're in the middle or at the back, you can hesitate and then look for an opening. Remember to look out for the guy behind you if you're in the middle and feel like hesitating.

- The non-grid start. All the cars are lined up on the same line, and no car has the advantage in distance to the first turn. Most clubs use this type of start. The strategy for a non-grid start is similar to a grid start, except for one thing:

(Continued on page 72)



Obviously this is an ideal position going into the first turn, if you can get it. Don't risk a crash to get it!

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QUARTER-SCALE COOLING SYSTEM

by RICH HEMSTREET

NASCAR STOCK-CAR RACES are usually 400 to 500 miles long and test both the car's speed and endurance. Similarly, 1/4-scale stock cars frequently run main events that are 200 laps or more. During the summer months, be sure your car stays cool while running in a long race, because an

overheated motor will leave you sitting in the pits.

The 23cc motors used in the 1/4-scale stock cars are fan-cooled. This means that even when the car is sitting still, air is being blown through the cooling fins on the motor. The motors are cooled internally by the oil that's mixed with the gas. If you don't use enough oil, the motor will overheat and

seize up. RACO* recommends a 40-to-1 gas-to-oil mixture. Only chainsaw or motorcycle 2-stroke oils should be used (never outboard and automotive oils).

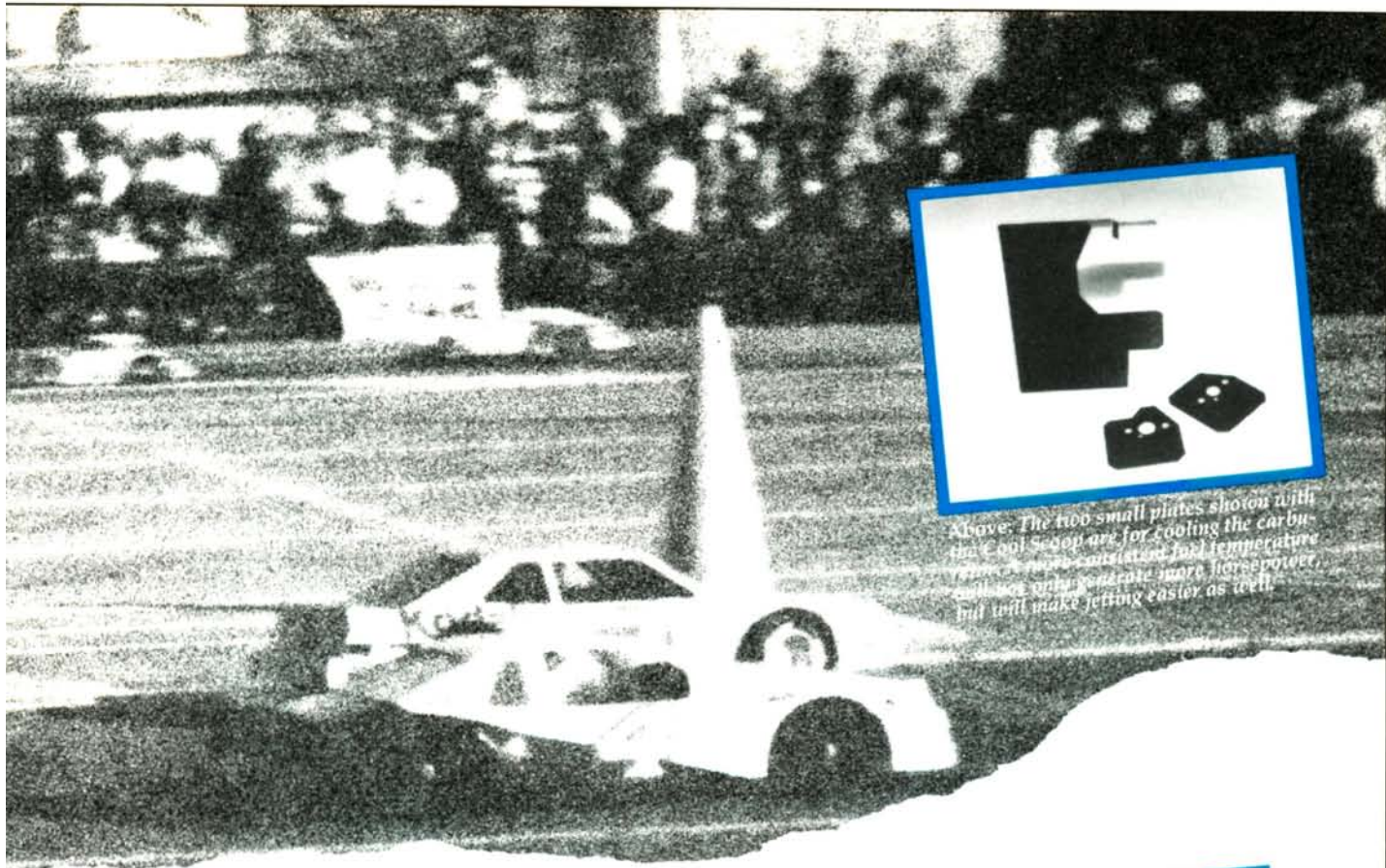
Hot Trick Racing Cars* make two parts to improve the cooling on the RACO GN Stock Car: the No. 424R RACO GN Cool Scoop and the No. 416R 1/4-scale Carb Cooling Fins. The Cool Scoop is a simple aluminum scoop that's attached to the top



With the cooling fan located so low on the Raco Grand National chassis, engine cooling is difficult.



By installing Hot Trick Racing's Cool Scoop, air is forced through the fan shroud, allowing for more efficient cooling.



Above: The two small plates shown with the Cool Scoop are for cooling the carburetor. They maintain fuel temperature, allowing you to generate more horsepower, but will make jettling easier as well.

chassis plate, directly in front of the fan shroud and recoil starter. The scoop will help to channel air from above the chassis down to the fan. This is necessary, because the fan sits so low in the chassis and is quite boxed-in, and this prevents it from taking in much fresh air.



The Cool Scoop sits too low to gain any cooling effects from cutting out the windshield, but the air supplied from the cut-out grill is more than adequate.

Instead of bolting in the Cool Scoop, use servo tape so that the scoop can easily be removed. The Scoop isn't needed for short races and is probably most helpful in the long events, where pit stops for

SET A HOT PACE WITH A COOL CAR!

fuel are required. To make the Scoop much more efficient, the grill area on the front of the car should be cut out. This will draw more fresh, cool air into the body shell of the car. The grill area on the RACO T-Bird is directly in line with the Cool Scoop.

On the other hand, cutting out the windshield and installing a screen in its place won't help as much. It will help to remove hot air from inside the body, but it won't really circulate more air to the fan, because the level of the windshield is so far above the fan. Even the Cool Scoop doesn't extend close enough to the windshield to draw air from it, and that much air isn't really needed. Aerodynamically, you're better off leaving the windshield intact and cutting out the small grill.

The Carb Cooling fins are bolted in place between the engine and the carb. They help to prevent the engine heat from being transferred to the carburetor. If the carb becomes too hot, it can cause problems with the fuel and air mixture, and that could lead to performance problems. Once they've been installed, the Cooling Fins are light enough to be left in place.

This summer, be ready for hot competition on the 1/4-scale stock-car circuit. Try Hot Trick parts for a cool setup and don't be left steaming in the pits.

*Here are the addresses of the companies mentioned in this article:
 RACO Model Craft, 1400 E. Saint Andrew's Place, Santa Ana, CA 92705.

Hot Trick Racing Cars, Inc., 1157 Cushman Ave., San Diego, CA 92110. ■



Polk's/
Aristo-Craft

DOLPHIN



by STEVE POND

THE NEW DOLPHIN off-road 4WD car from Polk's/Aristo-Craft* is their latest starting-line-ready (SLR) release. The first in the Aristo-Craft line to carry the SLR designation was the Kangaroo, the 2WD version of the Dolphin. The new Dolphin sports the same chassis and basically the same suspension geometry, with the addition of a front differential and a chain-drive system to connect the front and rear.

Ready-to-run, SLR cars are a new and growing segment of the R/C car industry, and there's a lot to be said for them. They do save the enthusiast a great deal of assembly time. The time usually spent on assembly is now spent racing or bombing around the yard. The down side of a ready-to-run car is that you might not know enough about it to repair it yourself when the need arises.

The Dolphin kit features a chain-drive system that's connected to front and rear gear differentials. The power is put to the chain drive with a Mabuchi RS-540S motor. This motor is connected to an electronic speed controller, which has a built-in BEC to accommodate the new Challenger 260 wheel radio. Independent rear swing arms and double wishbones in the front make up the suspension, and all four corners are dampened with oil-filled coil-over shocks. The front end is dampened with a horizontal mono-shock, and the rear is dampened with a pair of horizontally mounted shocks. These shocks have adjustable spring tension to adjust to different terrains and different types of racing. Other features include metal bearings on all four wheels, changeable pinion gears, a high-strength open chassis, a pre-installed servo saver, a rear bumper for gearbox protection and a pre-painted body.

Because this is a starting-line-ready car, it also includes a radio system, and the system included in all the Dolphin kits is the new

Track Report



Aristo-Craft Challenger 260. The 260 system is a 2-channel wheel radio with servo-reversing switches, LED indicators for RF output and battery, a low-power flashing indicator, a gear-type steering movement for accurate control, an adjustable trigger-neutral, and a charger connector for an optional gel-cell battery pack. The system includes an HS 402X steering servo (the electronic speed controller takes the place of the throttle servo) and a 2-channel AM receiver.

CONSTRUCTION: *None!* Actually, there are a couple of little chores you must complete before hitting the track, but if you call attaching the bumper a chore, you shouldn't be racing an R/C car! Putting the Dolphin on the bench, attaching the bumper and finishing the car by cutting and applying the decals, should take no more than an hour, or even less. When this is done, you must supply AA batteries for the transmitter and a 7.2V Ni-Cd pack to power the car. Now you can hit the dirt!

PERFORMANCE: Not having assembled the Dolphin, it was a little hard to guess how it would perform, so I just took it out and gave it hell! I tested the Dolphin on an old dirt road that's frequently used by 4WD trucks (full-size ones). These trucks make deep grooves that are ideal obstacles for 1/10-scale off-road bashing.

Throttle response from the Aristo-Craft electronic speed control was relatively smooth, but the speed of the Dolphin wasn't overwhelming. This could be caused by the motor or by the speed controller. Whichever is to blame, bear in mind that the speed controller never failed; it was just a little slow in reaching top speed. I haven't tried running the Dolphin with a modified motor, but the low maximum amperage rating may not be sufficient for this type of motor. It's best to stick with a stock-

class motor. I discovered that the speed controller has no braking circuit. This isn't bad, as the mechanical speed controllers have no "brake" either. However, when coming off the throttle to slow down, caution must be used so

that the speed controller isn't operated in reverse before the car has stopped. Operating the radio in reverse before the car has slowed will either cause the Dolphin to come to an immediate stop, or it will cause the differentials to strip or the chain to stretch. If the chain stretches, it

may jump some teeth under acceleration, and this will cause the differential to wear prematurely. No matter how you slice it, try to avoid it.

The handling portion of the test went smoothly, but there's a problem with the suspension geometry. The levers that actuate the shocks are a little too long on the front and rear of the car. When the suspension is compressed one wheel at a time, as it usually is, the Dolphin has no problem taking the bumps. Problems arise when both of the front wheels are

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DOLPHIN

Type 4WD off-road
Scale 1/10
DIMENSIONS:
Overall Length 16 1/4 inches
Width 9 3/8 inches
Height 5 7/8 inches
Wheelbase 10 3/8 inches
Front Track 7 1/2 inches
Rear Track 7 3/4 inches

CHASSIS:
Type Open frame
Material ABS Plastic

DRIVE TRAIN:
Type (prim./sec.) ... Spur/Chain
Differential Bevel gear

SUSPENSION:
Type (f/r) ... Double wishbone/
Trailing arm

Dampening (f/r) Oil/Oil

TIRES:
Front: Type Spiked
Dim. 3x1 inches
Rear: Type Spiked
Dim. 3 1/4 x 1 1/8 inches

ELECTRICAL:
Motor RS-540S
Speed Controller Electronic
Bearing Type Metal/Plastic
Battery Type Req. 6-cell flat

COMMENTS:
Good car for those who don't like to build. Could use a more informative instruction manual. Present manual doesn't show breakdown of car, which would be useful for repair work. A hotter motor would improve speed.

compressed at the same time. The levers are a little too long, and this causes the shock to fully compress after only about half an inch of suspension travel. With the shock bottomed out, the effect on the handling is noticeable; it can cause oversteer or understeer, depending on which wheel was compressed. This, however, isn't a serious problem.

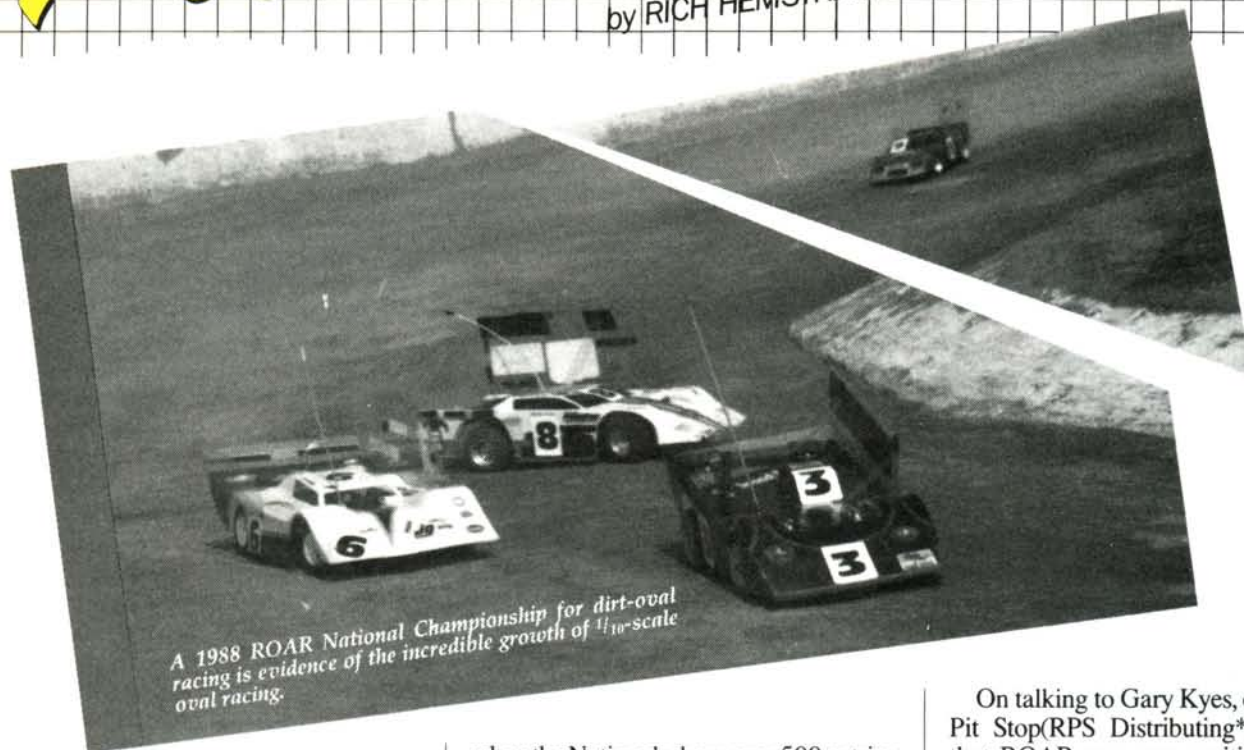
Apart from a couple of quirks, the Dolphin performed well. Please remember that this car isn't meant to be the next 4WD World Champion, and it certainly doesn't cost as much; it simply supplies the inexperienced R/C enthusiast with a quick means of getting onto the track. The purpose for which a car is designed must always be kept in mind when evaluating it. Of course, this car couldn't hold a candle to a Yokomo C4 or a Kyosho Optima Mid, but that isn't what it's made for; it's made for the beginner to have fun with, and it does just what it's designed to do!

*Here is the address of the manufacturer featured in this article:

Polk's/Aristo-Craft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

The Pole Position

by RICH HEMSTREET



A 1988 ROAR National Championship for dirt-oval racing is evidence of the incredible growth of 1/10-scale oval racing.

IN 1988, ROAR will crown more National Champions than ever before. New championships have been added in 1/10-scale oval and on-road racing, and oval events will be held on both dirt and pavement.

The 1/10-scale dirt-oval National Championship is scheduled to be held at the Hobby Box Raceway in Orlando, FL. The following week, the 1/10-scale and 1/12-scale paved-oval National Championships will take place at Lake Whip-poorwill International Speedway, which is also in Orlando.

Tulsa, OK, will be the venue for the first ROAR 1/10-scale On-Road Nationals, which will take place on June 16 through 19. All classes will use 6-cell battery packs and will run 4-minute races.

The 1/12-scale Nationals will be held indoors, on carpet, in Plymouth, MI, on July 7 through 12. These cars, too, will use 6-cell battery packs.

In 1988, ROAR will hold two separate off-road Nationals in an attempt to solve the overcrowding problems of last year,

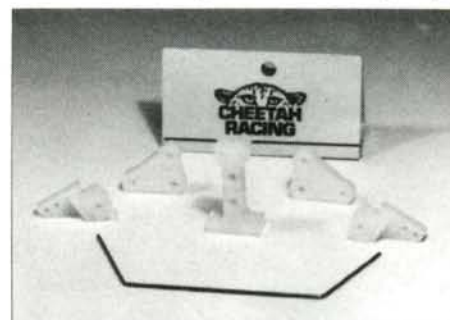
when the Nationals drew over 500 entries. From July 28 through July 31, the 2WD Off-Road Nationals will be held in Antioch, CA, and the following weekend (August 4 to 7), the 4WD Off-Road Nationals will be held in Huntington Beach, CA. ROAR officials aren't convinced that this will solve the overcrowding problem, but they knew something had to be done.

The 1/8-scale Nationals will be held on August 8 to August 13 in Richmond, VA, and this will be the final '88 ROAR National Championship.

ROAR is committed to improving their organization in various ways, and John Thawley, the "mouth of the North," is the national administrator—a newly created position. He aims to make National events run more smoothly and will attend each of the Nationals, as will the regional director and the scale director. This will give ROAR a three-man ruling body at each championship race, to be sure the rules are consistently followed. As well as this, the race promoters of each National will have more time to run the races and, consequently, fewer headaches!

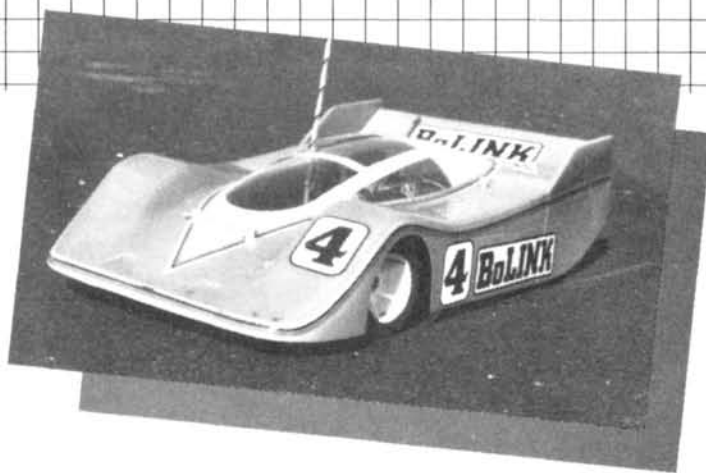
On talking to Gary Kyes, of the Ranch Pit Stop(RPS Distributing*), I learned that ROAR can now positively identify the new 1,700mAh batteries, which are still illegal by ROAR's standards. There was formerly doubt about whether these batteries could be detected, but there are distinguishable marks on the cases and these help us to identify them. This should be good news to racers with legal 1,200mAh battery packs.

McAllister Racing* is introducing a couple of new products. It's the latest manufacturer to produce a 1/10-scale, on-road car, and Gary McAllister is targeting



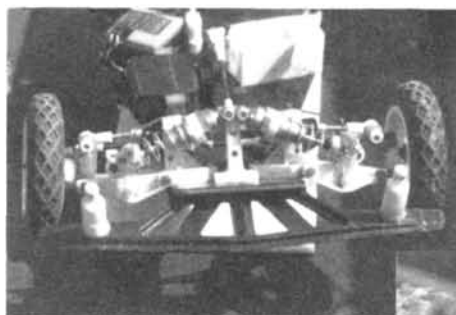
The Cheetah Racing Performance Kit, available through McAllister Racing, lowers the RC 10 suspension for high-speed oval racing.

A ROAR National event has also been scheduled to accommodate the needs of the new 1/10-scale on-road racing frenzy.



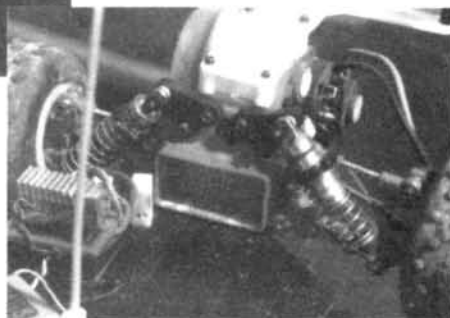
this new car at the entry-level market. If a racer progresses and wants to improve the car with modifications, he can add a Delta shock on the rear and ball bearings all around. This car should be available soon.

McAllister is also now selling the Cheetah Racing RC 10 Performance Kit. This kit provides the nylon parts and hardware needed to lower the Associated* RC 10 for oval-track racing. The kit replaces the stock front shock towers and provides a sway bar for the front of the RC 10. The new front shock mount is much lower and makes it easier to mount sleek outlaw stock-car bodies. You no longer have to cut holes in the hood for the shocks, and the rear shock mounting points are also changed.



Above: The Cheetah Racing Performance Kit lowers the front shocks on the RC 10 to a more horizontal position, to accommodate the low-riding oval bodies. Note Andy's oval bumper/body mount for oval bodies.

Right: Cheetah kit brings the rear of the RC 10 closer to the ground with new shock mounts and Associated short shocks.



One convenient feature of the RC 10 Performance Kit is that the standard RC 10 shocks need not be replaced. This kit works with either the standard, aluminum-tub chassis or the graphite chassis, which are found on so many RC 10s, but doesn't seem to work on the wide-front RC 10 chassis.

Tim Morton, owner of TRC*, says they'll soon be producing a fiberglass version of their TRC Pro 10, and this car will also be aimed at the entry-level market.

It looks as though 1/10-scale racing is continuing to grow, and with the new 1/10-scale ROAR National Championships on the line, even more manufacturers will get involved.

*Here are the addresses of the companies mentioned in this article:

RPS Distributing, 1655 E. Mission Blvd., Pomona, CA 91766.

McAllister Racing, 4545 Industrial St., Unit 5H, Simi Valley, CA 93063.

Associated Electric Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

TRC, P.O. Box 478, Oakboro, NC 28129. ■

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BAJA 250

(Continued from page 17)

Servos

- Skew-type armature motor allows movement of the trim lever, even by one notch, to be tracked. This approaches the performance of cordless motors.
- New indirect-drive potentiometer improves resistance to vibration and shock as well as neutral accuracy.
- Low-power custom IC provides a servo with extremely high torque, narrow dead-band and superior tracking.
- Fiberglass-reinforced PBT (polybutylene terephthalate) injection-molded servo case is mechanically strong and invulnerable to glow fuel.
- Strong polyacetal resin ultra-precision servo gear features smooth operation, positive neutral and very little backlash.
- Fiberglass-reinforced epoxy resin PC board with through-hole plating improves servo-amp vibration and shock resistance.
- Three-pin connector improves resistance to vibration and shock. Connector housing has an anti-reverse

insertion feature.

- Special grommet simplifies mounting of the servo and provides an excellent cushioning effect.
- Other adjustable splined horns are available. (Two are provided.)
- High 48.7 ounces to the inch maximum output torque allows versatile applications.

The transmitter is the business end of the new Baja 250 system. It's a 2-channel system; the right stick (Channel 1) is the steering stick, and the left stick (Channel 2) is the throttle stick. Each stick has a mechanical trim, which moves the stick pot. In addition, the throttle stick has a two-position neutral that is changed by an auxiliary trim lever, which is to the right of the stick. When the lever is up, the throttle stick can be moved a total of 54 degrees (up 27 degrees and down 27 degrees). This position is best suited to a car where the speed-controller neutral is at the central stick position. On the other hand, when the throttle-trim lever is down, you can set the speed controller for forward (a full 36 degrees), but neutral is at -9 degrees and reverse is 18 degrees of the

stick movement. This is best for cars where the neutral on the speed controller is offset, as is the case with one of the cars I'm now building (a Porsche 956).

The throttle stick can be changed from spring-loaded to a ratchet-type, and I did so with a leaf spring from Hobby Shack. The Baja 250 provides illustrated instructions on how to make this change.

The only other control on the front panel is the on/off switch, which is right under the neck-strap hook and voltmeter. The voltmeter shows the condition of the transmitter battery. When the pointer on the meter is all the way over to the right (silver part of the dial), the battery is at full capacity. The indicator will move to the left as the transmitter battery discharges. When it gets to the red part of the scale, it's time to change batteries. The only other controls are the servo-reversing switches, which are on the bottom left of the transmitter. As you look at the bottom of the transmitter, the steering switch is to the left and the throttle is to

(Continued on page 68)

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"AT LAST, NO MORE RUNAWAYS!"

Fred Murphy, R/C Car Action Magazine

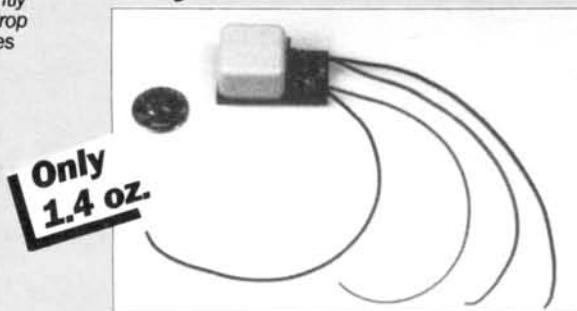
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THUNDER SHOT

The 44 Magnum
of the Tamiya
"SHOT" line.



The author, Joe Bruni, cracks an evil grin as he prepares to fire-up the Thundershot.

ACCORDING to Greek mythology, Zeus was the king of the gods—a mighty, majestic character who punished injustice and rewarded righteousness. Zeus had many ways to show his power, but the thunderbolt was the most intimidating.

In an attempt to advance its position in the 4WD off-road class, the Tamiya Plastic Model Co. of Japan (distributed in the USA by MRC*) has introduced a powerful 1/10-scale high-performance racing buggy named the "Thundershot." The Thundershot utilizes advanced R/C technology in an all-new compact, lightweight, aerodynamic design. It's been billed as an excellent choice for newcomers to 1/10-scale 4WD off-road racing who are seeking to get in on competitions.

The Thundershot offers a plethora of high-tech features. The nucleus of the car's design is its one-piece, lightweight, sturdy ABS resin bathtub chassis. To this are coupled two

(front and rear) sealed,

gearbox differentials that communicate directly via a centrally located steel drive shaft.

The suspension group utilizes the race-proven, independent, double-wishbone design. The rear wishbones are connected directly to the rear differential housing by two adjustable coil-over damper, oil-filled shocks, while the front wishbones are connected to each other by a single "monoshock." This monoshock lies on a horizontal plane, so when one side of the suspension system encounters rough terrain, the opposing side compensates, so allowing



tighter control. For added stability on corners, an adjustable, front anti-roll bar kit has been integrated. Also included in the kit are four lightweight, one-piece, racing wheels matched to four semi-pneumatic, spiked, dirt-racing tires, a 540 motor and a reliable three-step forward-and-reverse speed controller. The car is topped off by an aerodynamically designed, clear Lexan body.

The Tamiya Co. is noted for the excellent quality of its instruction manuals, which make assembly easy for any modeler. This kit is no exception; the manual includes not only detailed assembly illustrations, but also helpful footnotes, performance tips, tool requirements and an in-depth troubleshooting section.

THUNDERSHOT

Type 4WD off-road
Scale 1/10

DIMENSIONS:

Overall Length 15 1/4 inches
Width 9 1/4 inches
Height 5 1/2 inches
Wheelbase 10 1/2 inches
Front Track 7 7/8 inches
Rear Track 7 7/8 inches

WEIGHT:

(w/rec. bat.) 3 lbs., 7 ozs.

CHASSIS:

Type Monocoque
Material ABS plastic

DRIVE TRAIN:

Type (prim./sec.) Spur gear/
Shaft
Differential Bevel gear

SUSPENSION:

Type (f/r) Double wishbone
Dampening (f/r) Oil/Oil

Tires:

Front: Type Spiked
Dim. 3 1/4 x 1 1/2 inches
Rear: Type Spiked
Dim. 3 1/4 x 1 1/2 inches

ELECTRICAL:

Motor RS-540S
Speed Controller 3-step
Bearing Type Plastic
Battery Type Req. 6-cell flat

COMMENTS:

The Thundershot features many performance items, e.g., ball ends, lighter suspension arms, front sway bar, and idler-arm steering that make this the most competitive Tamiya 1/10-scale car. Could use a rear bumper to protect it from a rear collision.



throttle and steering exponential curves; brake trim; left/right steering brake-points; and servo reversing.

CONSTRUCTION: The first nine construction steps involve the installation of the car's radio and electrical system into the main chassis. The kit includes all the necessary hardware for properly fitting any size of servo. The manual suggests the use of a battery eliminator circuit (BEC), and since the Magnum doesn't include one, I bought a Futaba BEC kit and followed the installation procedure as outlined in the manual.

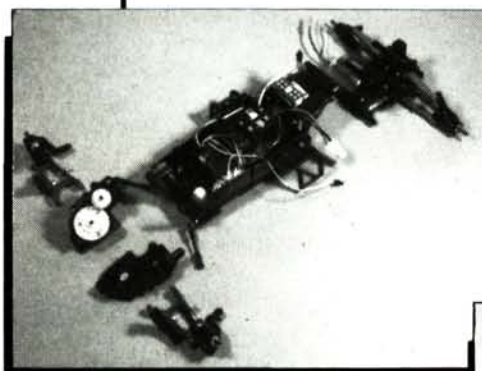
The next three steps are the rear body-post installation and front steering assembly, which is relatively easy if you use a needle-nose pliers to snap the ball connectors together. The following seven steps involve assembly of both differential systems. Buy some extra gear grease (remember to buy grease that's compatible with plastic) for assembly of the differential, because the grease provided in the kit isn't enough for proper lubrication of both differentials.

If you're considering racing your Thundershot competitively, or want maximum performance, then you should buy and install the optional, steel ball-bearing set. You'll not only decrease wear and tear, but will also greatly improve overall performance. By the time this track report is published, your local hobby store should be able to provide you with a complete bearing kit for your Thundershot.

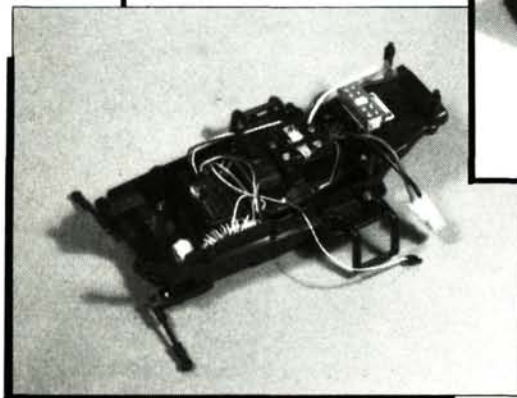
After completing the differential assemblies, it's time for motor installation. Tamiya provides a unique pinion-gear spacing tool that makes attachment of the pinion gear to the motor shaft a perfect fit every time. Another good feature is that the provided motor-mounting plate has numerous pre-drilled holes that

(Continued on page 102)

Some basic tools, such as screwdrivers of various sizes, a pair of needle-nose pliers and a modeling knife are needed to construct the Thundershot. The kit doesn't include the necessary radio equipment, but any standard 2-channel car radio can be used; I chose the Futaba* Magnum car system for this track report. The Magnum features a pistol-grip design and has a long list of advanced capabilities, such as adjustable



The "exploded view" of the chassis shows how simple the design is compared to its predecessors.



Although installation is a little tight, radio gear is much more accessible in the Thundershot.



The new EX 1,700mAh battery pack from Tamiya was used in the Thundershot with amazing results. This battery pack will give you 40 percent longer run time or 40 percent more power, depending on how you gear the Shot.

BAJA 250

(Continued from page 62)

the right. When the switches are to the left, the servos are in the normal position; when the switches are moved to the right, the servos are reversed.

One final comment on the BEC: To use it, the plugs on the speed control and the receiver have to match. If they don't, call your hobby shop to find the proper connector, or simply solder the wires together.

To sum up: I think the Cirrus line has another winner with the Baja 250. It's a very reasonable price—would you believe \$59.99! Hobby Shack also has a large service organization, and, in the event of problems, will stand behind its products.

Contact Hobby Shack for more information; and tell them that you read about their radio in *Radio Control Car Action*. Until the next issue...

**Here is the address of the manufacturer featured in this article:*

Hobby Shack, 18480 Bandelier Cir.,
Fountain Valley, CA 92728.

SCOPING OUT

(Continued from page 18)

controller will illuminate, and then extinguish. If you make a mistake, the light will flash, and you can try it again. All settings, except for the trigger/switch calibration, can be entered with the transmitter off.

The following functions can be programmed:

- Trigger calibration
- Variable brake
- Acceleration rates
- Trigger response

We programmed a range of settings for all the above functions, so that comparisons could be made on the test equipment, and the Pro Zeta performed as advertised. The oscilloscope clearly showed the difference in acceleration, braking and trigger responses when each function was re-programmed. These responses matched the diagrams in the manual.

Each function can be programmed independently and in any order, and one function can be modified without affecting the other functions. The settings for the associated functions are stored in the controller's memory even when the con-

troller is shut down or unplugged. These settings allow the user to tailor the response of a particular car and motor setup to the track. The acceleration rates allow you to tune out wheelspin coming off corners, no matter how hard you depress the throttle, and lets the car reach full speed as quickly as it can. The braking-characteristic settings allow for the best action without over-braking; again, no matter how fast you release the throttle. In addition, the throttle-response settings allow you to tailor the trigger/stick response to reactions that are most comfortable for you, the driver. What does all this mean? You'll be more competitive because you can concentrate more on steering and strategy without having to think about throttle settings.

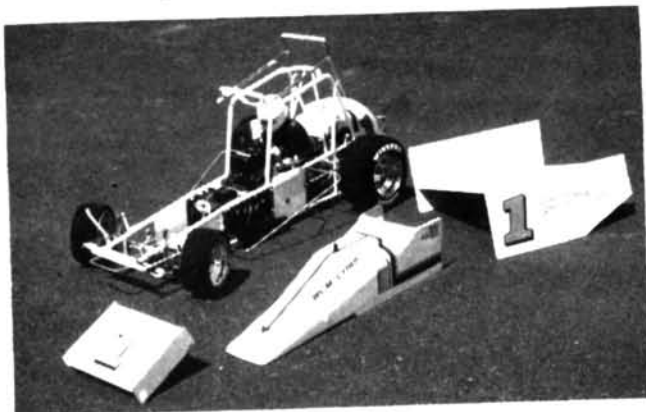
Non-programmable features that make the Pro Zeta controller a good investment are the automatic-power MOSFET thermal shutdown and recovery, and software de-glitch filtering. The forward-power MOSFET's temperature is monitored by the controller, which will automatically shut off drive to these transistors before they burn out. When these tran-

(Continued on page 70)

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SCOPING OUT

(Continued from page 68)

sistors cool down, the controller will automatically turn them back on.

The software de-glitch filtering monitors the command pulses from the receiver. If these pulses are outside the proper range, the controller will use the last known good pulse. If the receiver doesn't supply any known good pulses for one second, the controller will shut down drive to the motor and so prevent the model from running away and crashing.

When testing the speed controller, I did find two problems that are actually one programming problem. First, to program the controller you have to plug the handheld programmer into the controller. In doing so, the only keying is a line on both connectors, so if you plug it in backwards, nothing will happen to either unit, but you won't be able to program the controller. I also found that after several matings of the connectors, the pins were being pushed out of the connector body. Second, with the programmer connected to the controller, you can't test your change unless you disconnect the programmer and wait two seconds. Since P.D.I. put so much thought into the overall design of the unit,

I think they should look into programming the unit using a wireless infrared programmer, and eliminate an area that's prone to failure. Apart from this, the product is great. While somewhat expensive, this device does give you a lot more than other speed controllers, and it does come with a warranty.

If you're a serious on-road or off-road racer, you should consider the Pro Zeta as part of your racing team!

**Here are the addresses of the companies mentioned in this article:*

P.D.I. (Product Design Inc.), 16922 N.E. 124th St., Redmond, WA 98052.

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220. ■

ABS BODIES

(Continued from page 35)

When all the base color (orange) had been applied, I accented the lower edges of the body with silver "fogged" on from the spray can. This technique makes the silver blend gradually with the base color. I also sprayed the wheels silver to complement the body colors. Next came the application of some Autographics* pin

(Continued on page 72)



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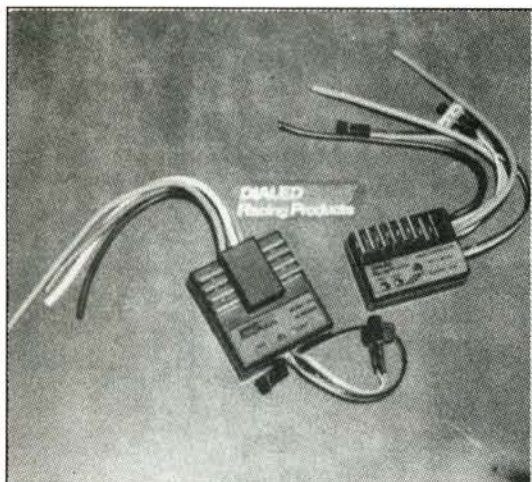
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ABS BODIES

(Continued from page 70)

striping and our RCCA decals, followed by three light coats of Testor's* clear gloss. Remember, this step isn't necessary if your colors were gloss to begin with. Finally, I used Pactra Paint Sticks to give a more realistic look to the windshield, chrome trim and sunroof frame. These paint sticks are very easy to use, contain real paint and give you control you can't always get with a paintbrush.

The whole paint job was done with less than five bucks' worth of material, required no exotic equipment or tedious masking and produced a really sharp-looking, durable finish which will blow the doors off the dudes with the "just-brushed" look. Yeah, we're still into the airbrush thing, and we'll show you more techniques in future issues, but give this cheap-o method a shot... it works!

*Here are the addresses of the manufacturers mentioned in this article:

Tamiya/MRC, 2500 Woodbridge Ave., Edison, NJ 08817.

Pactra, 410 N. Michigan Ave., Rm. 1280, Chicago, IL 60611.

Autographics of California, 1700 14th St., Bakersfield, CA 93301.

Testor Corp., 620 Buckbee St., Rockford, IL 61101. ■

RACER'S EDGE

(Continued from page 51)

Everyone will arrive at the corner at the same time, and it's always a mess. It's not unusual for most of the pack to overshoot the first turn, i.e., they'll go into the turn too quickly to take it properly. A good strategy on this type of start is to hang back and stick to the inside board. This way, you'll usually turn inside of everyone and be in a good position coming out of the first turn. Remember, *the start is the most important part of any race*. Here's a general rule of thumb: On the first or second row of a grid start, always try to get the lead at the start, but if you're anywhere else on the grid, wait a split second and try to pick your way through the mess. On a non-grid start, if the first turn is a sharp one, most people will overshoot it. Try not to carry too much speed into the corner, so that you'll be able to turn inside the rest of the pack in the first turn. I'm not guaranteeing that this will work every time, but it's a good point to begin planning your starts from.

When planning the start of your race, you *must* know who you're driving with. This may be tough at larger races, where you aren't familiar with some of the other drivers, but you should ask around and

(Continued on page 76)

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RACER'S EDGE

(Continued from page 72)

find out about the other drivers in your Main. The more information you have,

the better you'll be able to make a decision on whether or not to go for it at the start.

Practice

Here are some basic driving rules to keep in mind during practice, whether you're driving a 1/12-scale on-road car or a 1/10-scale off-road racer.

- The best way to learn a new track is by watching others practice. This will show you where you might have problems. Never try to drive the track as fast as you can at your first practice, because at this point you'll have no idea of the track layout, and your practice session will probably end with a broken car. During practice, learn the track as quickly as possible without destroying any of your equipment. Learn the track during the first two practice runs, then make changes to the car, if necessary. This ensures that when a change is made, you'll be able to drive the track well enough to see the results. To learn a racetrack, you don't need to have a car that is set up perfectly. Learn to drive the track as fast as possible with whatever setup you start with, then make the changes necessary to chip away at your lap times.

- Always have a knowledgeable friend watch your car run on the track and time your laps, so you can get an idea of the

(Continued on page 87)

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T R A X X A S



by RICH URAVITCH

Left: Rocketing along the blacktop, the Fiero concludes a late-day race.
Below: Low-angle shot shows off the lean, trim lines of this colorful GTP.

FIERO GTP



A R E A D Y - T O - R U N 1 / 1 2
G T P R A C E R . I T ' S
F A S T A N D C O M P E T I T I V E !

WOULDNT YOU KNOW IT? Just about the time I get to run the Traxxas Fiero GTP, General Motors makes noises as if it's about to send the full-scale Fiero the way of the Corvair and Vega—into the annals of history. This will probably mean the end of GTP racing for the GM version, but the Traxxas 1/12-scale parking-lot racer will probably run in the opposite direction, remaining a formidable machine.

This runner is available as model 1402, which is finished and requires only a battery pack and eight AA batteries for the transmitter, and as model 1401, which is the kit version that you assemble. Both versions have some pretty neat features, including a rugged flex-plate-type chassis; a single, adjustable oil shock on the rear; an RS-540S motor; sponge slick tires on plated wheels; and a wound-resistor speed control with reverse.

As already mentioned, our version was ready-to-run, with the radio installed and all linkages hooked up. The transmitter is the typical 2-channel, twin-stick variety, which I found had excellent measured range, well in excess of 250 feet. A 1/12-scale Fiero starts looking rather small at this distance! The receiver

incorporates the now-common BEC (Battery Eliminator Circuit), which does exactly that; it enables the receiver, servos and RS-540 to operate off the same 6- or 7-cell pack. The pre-painted, pre-decorated polycarbonate body is attractively finished in white with blue and black trim, and the only problem I can see here is that while competing against other Fieros, yours might be difficult to identify! This is the price you pay for having the factory do all the work for you!

While I can't comment on how the kit version goes together, my car came with the instructions that are provided with the kit, and they appear to be easy to follow. They include 18 pages of photos and illustrations showing each step of assembly, and I consider this valuable information, especially when repair or modification time comes! Also included in all this paperwork

Type Blacktop/carpet racer
Scale 1/12

DIMENSIONS:

Overall Length 13¾ inches
Width 6¾ inches
Height 3 11/16 inches
Wheelbase 7¾ inches
Front Track 6 5/8 inches
Rear Track 6 5/8 inches

WEIGHT:

Gross
(w/rec. bat.) 2 lbs., 6 ozs.
Balance (f/r) 40/60

BODY:

Type GT Proto class
Material Pre-painted polycarbonate

CHASSIS:

Type Flex-plate
Material Fiberglass

DRIVE TRAIN:

Type (prim./sec.) Direct to gear differential
Differential Nylon gear

SUSPENSION:

Type (f/r) Sprung independent king-pin
Dampening (f/r) Spring/Single coil-over shock

TIRES:

Front: Type Sponge slick
Dim. 1 7/8x1 inches
Rear: Type Sponge slick
Dim. 2 3/16x1 3/8 inches

ELECTRICAL:

Motor RS-540S
Speed Controller Wiping resistor

Bearing Type Oilite (wheel)

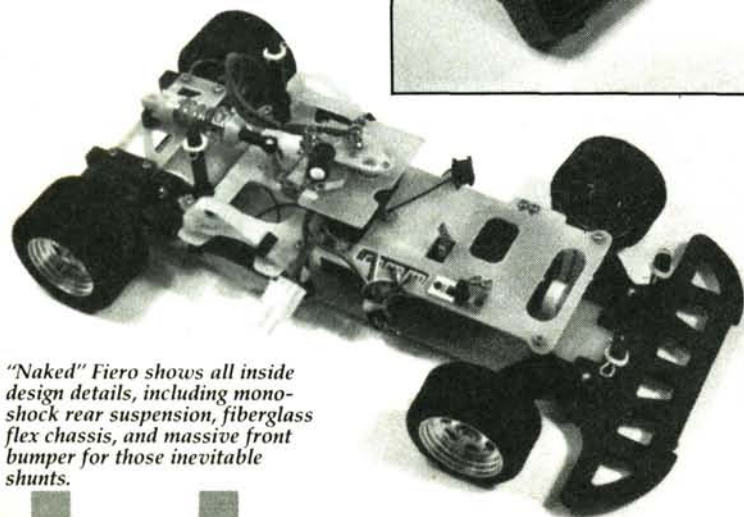
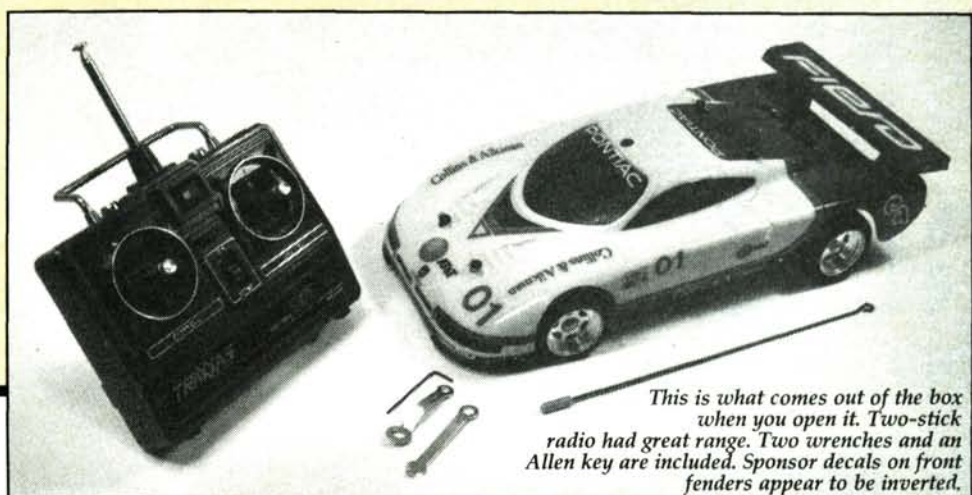
Battery Type Req. 6- or 7-cell

OPTIONS AS TESTED:

- None

COMMENTS:

Excellent performance. The vehicle tested was ready-to-run, but is also available as a builder's assembly kit.

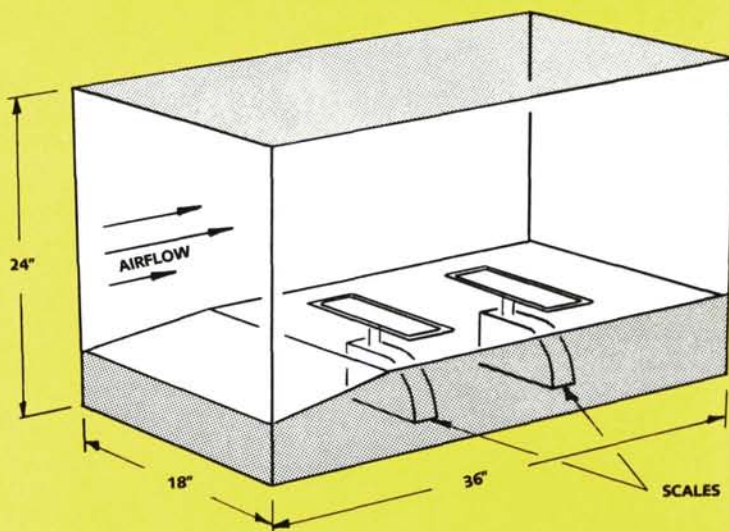


are a replacement parts price list, an order form, an operating guide with some troubleshooting and maintenance tips and a warranty card.

From a design standpoint, the Traxxas Fiero is conventional. It neither employs any really complicated or exotic techniques, nor does it contain a lot of "tuning" capability. I suppose you could run a hot wind, experiment with tires and play with the shock a bit, but

(Continued on page 102)

HOW TO: BUILD YOUR OWN



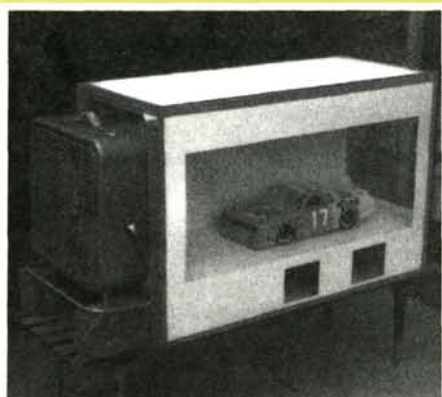
WIND TUNNEL

FINE-TUNE THE AERODYNAMICS OF YOUR RACER

by
CAROL ANN
GOLDSCHRAFE

THE NEED TO PRESENT a junior high school science project, combined with an interest in R/C cars, led me to study aerodynamics. I hope my findings will help you in your constant quest for speed.

The main feature of this project was a working wind tunnel, built to demonstrate various principles; I wanted to use my R/C car because it would be big enough to produce visible results, but small enough to fit into a portable chamber. The library had no car-related material on this subject, so, to get started, I applied some aviation theories and principles. I found some relevant information in racing magazines, with technical explanations of spoilers, ground effects, and drafting by Bill Elliott and Richard Petty. I used this material to make posters showing race-car streamlining through the years, and airflow over and around a car at speed. I also used some magazine photos of Petty's spectacular Daytona



The completed wind tunnel, set up and ready for experimentation.

500 wreck to illustrate what happens when aerodynamics works against you. When Petty's car was turned around by another racer, it actually lifted off the track and barrel-rolled along the fence at 190mph.

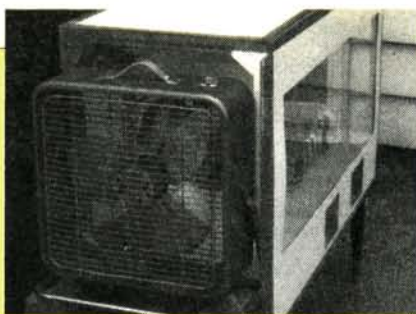
My wind tunnel was built of artist's illustration board, foam-core art board and a piece of Plexiglas, all easily held together with double-sided tape and strapping tape. A household fan with an 18-inch-diameter blade blows air

in at one end, and the breeze is free to flow through the tunnel and out of the other end. Particular attention was paid to the interior, which had to be kept smooth so that it wouldn't affect the airflow, and some double paneling was done to accomplish this. A sub-floor, about seven inches from the bottom, covers a pair of letter-size postage scales, and flush-mounted hatch panels fit into the sub-floor on top of the scales. During operation, the car and scales were observed through windows in the Plexiglas.

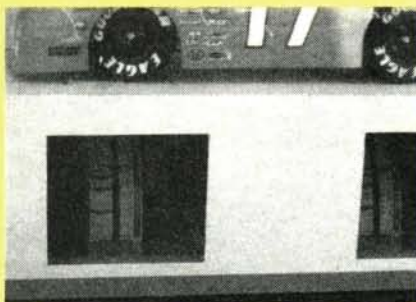
I demonstrated the airflow over the car's body by taping dozens of small pieces of string onto the car, all pointing toward the rear. You might expect the string to continue to point in this direction when the fan is turned on, but the results are quite surprising! Much of the air hitting the front of the car tries to go around the sides, and it's very turbulent around the front wheels. The little pieces of string wiggle violently there, indicating that a good deal of the effects of

streamlining is lost. The airflow along the sides is fairly smooth, with additional turbulence around the rear wheels and at the back, where the airflow breaks away from the car. The air that does make it over the front of the hood flows to about the middle, and then rises over the windshield and the roof. At the base of the windshield there is a low-pressure area of little turbulence, as shown by the pieces of string in this area, which just flop around lazily. On my stock car, some of the airflow "spills off" the sides of the windshield and creates turbulence around the open side windows.

The base of the fastback rear window is another low-pressure area, made even more apparent with different spoiler configurations. The air flows smoothly off the spoiler and creates a "dead" area behind the car that is the secret to the "draft," where a second car follows the first at racing speeds, with only inches separating them. This pocket, or vacuum, tends to "suck" the second car along and pre-directs the air over the hood, so eliminating the drag caused by the front of the following car. The leading car benefits by having the second car break the suction caused by the vacuum, and both cars will be able to go faster. In full-size stock-car races, this "drafting" technique is often used by a dozen or more cars following nose-to-tail, so optimizing the effect. Woe to the driver who thinks he or she can pull out of the middle and pass; it's like running into a wall, and the car may lose several positions before the driver is able to tuck in at the end of the pack. As our R/C cars don't carry their drivers, it's difficult for us to see well enough to maintain a close following position behind



Household fan provides enough wind to simulate realistic race speeds; intent is to use more powerful fan in future testing.



Windows allow observation of mail scales to measure downforce.

another car at high speeds, so drafting will probably be useful for only brief periods.

The information accumulated with the airflow tests is useful in some areas; careful trimming of the body around the wheels and the use of wheel covers will improve airflow and perhaps increase speed on a fast track. It will also help to have closed side windows and a body mounted as low as the rules will allow. If body type is left to choice, a GTP-style car or a "wedge" design will probably show less drag and turbulence than my Monte Carlo stock car.

Several spoilers and other similar devices were tested to determine their effects on downforce. The extra downforce will increase traction and

cornering ability. The two postal scales are located under the wheels, and by noting the scale readings with the fan off, and then with the fan on, and blowing air over the car at realistic R/C car speeds, the amount of downforce exerted on the front and rear can be measured. I found that it took a substantial spoiler to make any noticeable difference. I doubt that this downforce increase will be usable, as a considerable amount of drag is generated by the larger spoiler. What this means is that unless you also come up with some free horsepower, the spoiler really won't help. The same goes for front-end diaphragms, but some types will help to prevent air from getting under the car.

The only effective aerodynamic aid for R/C cars is the sprint-car type of wing panel, but this must also be used with restraint, as too much will increase drag and slow the car down. The Can-Am-style wing spoilers seen on some 1/10-scale cars at high-speed oval tracks do improve handling. However, improvement is probably due just as much to the weathervane effect (which stabilizes the car because of drag) as to the amount of downforce actually generated.

I didn't have much time for further experiments, because I had to take the wind tunnel into class. After earning a good class grade, the project was selected to go on to the science fair, so I'll have to wait to do more tests. Using a more powerful fan, I hope to test high-speed drag cars, as aerodynamics is even more important for them.

I hope I've inspired you to think about your car's aerodynamics, and perhaps to take my experiment even further. Who says science isn't fun?! ■

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RACER'S EDGE

(Continued from page 76)

fastest way around the track. He or she can also be on the lookout for handling problems that can only be noticed at track level. Many times, the drivers' stand is noisy, and it's hard to detect whether or not your diff or belt is slipping or if you have a bad gear. Never go out on the track for practice without someone to watch you, unless you don't want to learn anything from your practice session!

- During a practice session, never change more than one thing on the race car at a time. When trying to set up a car for a particular track, remember what you changed and what the effects of that change were. If you make more than one adjustment on the car at a time, you won't know what cured your problem. (i.e., Was it changing the camber of the front wheels or putting on new front tires that eliminated the steering problem?) Keep a journal describing all your setup changes and the effects of those changes so you can review them at the next race. It's hard to remember what more caster or camber will do for you until you get more experienced at setting up your car.

When I started racing at the age of 7, I was always told to keep my cars clean

and in good condition, to concern myself with "how," and "how fast" would take care of itself. The tips in this article are the

most important ones that I've picked up and developed in my 13 years of racing R/C cars. I guarantee that if you follow

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RACER'S EDGE

these rules and conduct your racing in an organized and systematic fashion, you'll notice an improvement in your performance at the races.

Editor's Note: A newcomer to the staff of Radio Control Car Action, Joel Johnson, the 1987 IFMAR World Champion, will provide a broad range of valuable information. This will include tips on driving etiquette, both on and off the track and at the local and professional level. His regular

column will also give us advice on the driving techniques that put him in the winners' circle in both on- and off-road events all over the world. If you have any questions, please write to Joel Johnson, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. ■



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DUSTER 540

(Continued from page 27)

competitively with all major brands and types of cars. A couple of front-row starts boosted our morale considerably, and "Rebel" Phil Cantrell began to have fun racing this car. Just to prove that this thing wasn't thrown together haphazardly, we won the Concours trophy at the series finale, and a lot of people wanted to know what kind of car it was! The "Reb" took the Duster 540 down south with him, intending to run it on some of the big tracks down there, but we'll have to wait for an update.

In the meantime, why not try one of these yourself? Even if you have to buy the running hardware, it will still save you a bundle over the price of an entirely new car. The plans are available from *Radio Control Car Action* magazine, and show all the details you'll need to build your own Duster 540!

*Here are the addresses of the manufacturers mentioned in this article:

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FIREFOX

(Continued from page 22)

amount of power put to the rear wheels with the 6.75-to-1 gear ratio was remarkable. Throttle did, however, prove to be the key to a clean run. Full throttle off the line did nothing but cause the tires to break loose. With careful acceleration off the line, allowing the Firefox to come to full speed about 75 to 100 feet out, the runs were pure excitement. The times and speeds prove this.

Fine Design has done its homework and is no doubt going to be the force to beat in 1/10-scale drag racing. Combining simplicity of design with a minimum of weight and a possible record-setting performance the first time on the track, the Firefox II may well be the unfair advantage in future drag races.

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Run 2	2.53	52.81
Run 3	2.34	58.41
Run 4	2.47	56.09
Run 5	2.44	55.96

1/10-scale quarter mile = 132 feet.

*Here are the addresses of the companies mentioned in this article:

Fine Design Manufacturing, 2 North St., Middletown, NV 10940.

R/C Research Engineering, 823 Ricket Rd., Unit 15, Brighton, MI 48116.

Trinity, 1901 E. Linden Ave. #20, Linden, NJ 07036.

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FINAL COUNT.

(Continued from page 42)

thrust line is straight and level. This helps prevent inopportune takeoffs and extremely sharp turns upon ignition.

• Chute. I made my chutes, but rocket manufacturers make several sizes that work quite well. A rule of thumb: The diameter of the chute should be at least one-and-a-half times the width of your car. The material for the chutes came from an old decorative windsock. I tried two styles: a very simple X-type chute

and a more traditional round chute. Although the X-type chute is simple, it requires very accurate sewing. If the pieces of material aren't sewn perfectly square, the chute may spin, wrap its lines and collapse. The round chute worked best for me.

To make the chute, I cut seven panels, each in a shape that resembled a parabola. The more panels you use, the rounder your chute will be. Sewing their sides together produced a hemisphere. I cut

seven pieces of string, all 18 inches long, and singed the ends of the string to prevent unravelling. I hemmed around the outside edge of the chute by folding over a quarter inch of the material and folding in one end of each string line. Sew around twice for added security. Be certain that the lines are of equal length, then pass them through a 1/4x1/2-inch washer.

Tie a half-knot, then wrap one strand around the remaining ends. Secure the wrap with CA, and trim away any loose ends. The washer secures the chute without fraying the lines. Attach the washer as close to the center as possible; you're ready to pack the chute. With one hand, grasp the chute in the center; with the other hand, grasp the washer. Pull gently to put tension on the lines and to straighten the folds of material. Fold the chute in thirds, then neatly wrap the lines around the folded chute. Place a patch of cotton cloth, or even a few layers of tissue, deep into the chute tube, followed by the chute. Unless you used asbestos rather than nylon for your chute, always provide packing between the motor and the chute. Anything left close to the nozzle of the rocket during the power phase of the run

(Continued on page 96)

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FINAL COUNT.

(Continued from page 94)

will look like a well-done toasted marshmallow, so remember to always check the lines for clearance before each run.

● Radio. I used a Kyosho Pulsar EXP-2001 to provide both dual and exponential rates. The receiver is mounted on Velcro,

which works well and provides a cushion for the receiver. It also allows me to move the radio to another car quite easily. When mounting the receiver battery, be certain to make it firm, as any shifting of weight at top speed can be disastrous. This type of car is a perfect place for a 100mAh battery pack, since the only

drain is one servo, and the run lasts less than ten seconds. To reduce weight as much as possible, I used a Futaba S-33 servo for steering. So far, this car has shown that if you use good equipment, you can always count on trouble-free runs.

(Continued on page 98)

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FINAL COUNT.

(Continued from page 96)

SETTIN' UP TO ROLL: Having a good run depends on two things: rolling easy and tracking straight. Ball bearings are good, but if the tires and chassis aren't "true," the car just won't roll too far. Glue your tires to the wheels, because they'll be turning faster than ever before. When they're glued, "true" them. Place an axle in the chuck of your trusty drill, then place a tire/wheel combination on it. Using a manicure-type emery board, sand each tire until it's round and true. Dial-in a little more toe-in than is usual when setting up the steering, as you want this beast to be stable.

To let it rip, find a smooth stretch of pavement—preferably asphalt, and definitely clear of cars! When the power is on, even a small bump can send the car skyward. During an early test run, Mark Thompson (of Slot and Wing Hobbies) and I discovered just how high a rocket car can fly. When the car caught a dip in the pavement, air got under the body and away it went. Make sure that you have a smooth track, free of any traffic and people.

If you have exponential rates on your

(Continued on page 100)



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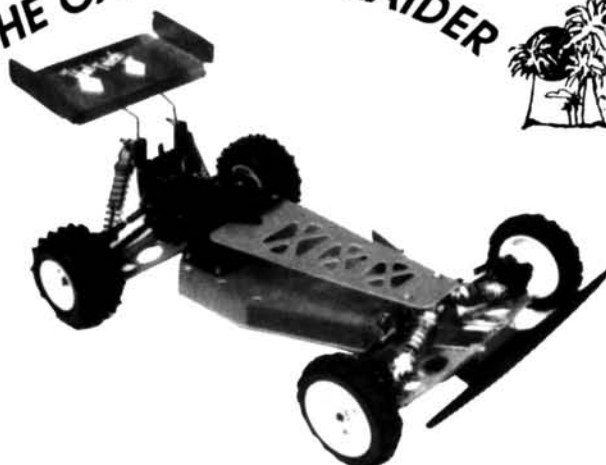
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FINAL COUNT.

(Continued from page 98)

radio, adjust for a soft, neutral position. If you have a dual rate, set it to the slow rate. Keeping the nose straight at speed doesn't require a great deal of steering deflection; only the turn-around at the end of the run uses any amount of wheel travel. Test-roll your car several times to get the trim just right. Ninety percent of the run is the start, so proper trim and alignment are critical to a safe, fast run.

As I also fly R/C planes, I have a flight

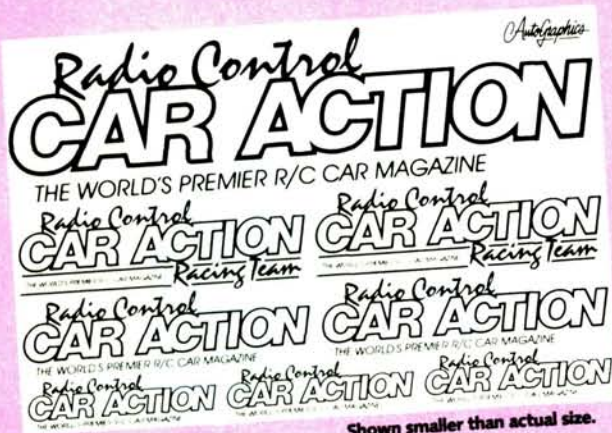
box equipped with terminals for a fuel pump, and this has worked well as a source of ignition power. Always use the electric igniters provided in the package with the rocket motors, as using any other method to start the rocket just isn't safe.

Well, that's it. Check for a clear course, count down to ignition, press the button and... Yeow!... What a rush! In two-and-a-half seconds, that little monster is at full speed. Three seconds later... Pop!... There's the chute! It's 200 feet away and

your heart is in your throat. Let me remind you that caution and common sense are a definite requirement when you're dealing with rocket power. Dig that old 1/12-scale track racer out of the junk box and have a blast!

**Here is the address of the manufacturer mentioned in this article:*

Kyosho; distributed by Great Planes Distributors, P.O. Box 4021, Champaign, IL 61820.

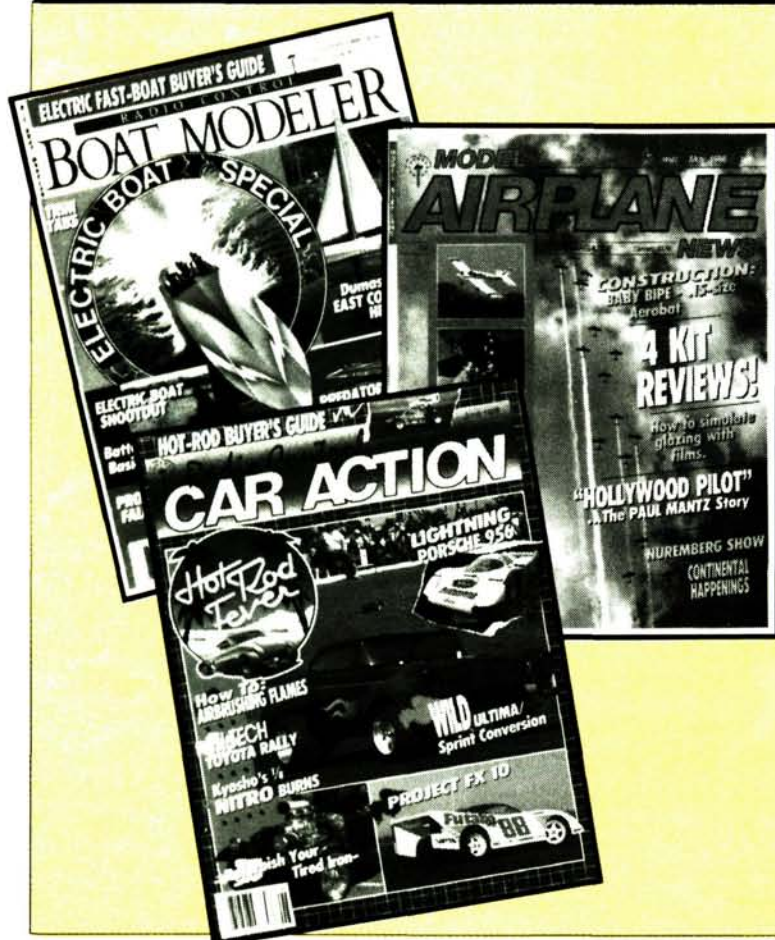


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FIERO GTP

(Continued from page 79)

the real strength of this car, and the thing that I suspect could create a little niche for it, are its "out-of-the-box" speed and handling capabilities.

I first ran the Fiero on blacktop, and I was instantly impressed with its acceleration. The immediate response of the steering took some getting used to and could stand to be desensitized. It would probably be OK for a short, tight carpet track, but on the more open, longer blacktop, where you can really get on the throttle, I'd reduce the throw. It's almost

impossible to get this machine sideways, and it's impossible to make it turn turtle. Full-throttle, almost hard-over steering input will cause it to change direction rapidly with just a hint of drift, but no really uncontrollable skid. Testing the durability of the wound-resistor controller (and the suspension), I accelerated in reverse, went to lock on the steering and immediately slammed the throttle into forward, so producing the neatest Hollywood-style reversals ever. Both the car and the speed controller survived! I don't recommend that you subject your

cars to this type of testing, especially those equipped with the non-mechanical (electronic) controller units.

I verified that the BEC system was functioning properly, when the battery ran down and the Fiero picked a circular line on its own and continued at reduced speed. A freshly charged pack had us off and running again.

In these days of instant gratification and limited time to build, the ready-to-run version of the Traxxas Fiero fills a definite need for the on-road or carpet racer by providing an attractively priced, nicely packaged and potentially competitive car. Mine is still holding up well, but it will soon need new rubber, at which time I may explore the possibility of some larger boots. Did I find anything wrong with the Fiero? Sure; there was a typo on the cover of the instruction sheet... I'm still looking for a fault on the car itself! Do yourself a favor and pick one up; show more faith than GM. Besides, with them dropping the marque, you may end up with a collector's item!

**Here is the address of the company featured in this article:*

Traxxas Corp., 12150 Shiloh Rd., Dallas, TX 75228.

THUNDERSHOT

(Continued from page 66)

are numbered to coincide with a variety of pinion gears (from 13 to 17 teeth), so ensuring a proper fit. They mesh with the rear differential system, no matter what ratio is chosen. At this point, the motor is attached to the rear differential, and assembly continues with the construction

(Continued on page 104)

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THUNDERSHOT

(Continued from page 102)

of the front and rear suspension systems and the installation of the four dog-bone-type drive shafts that connect directly to the wheel axles. Again, here's an ideal opportunity to replace the polyacetal plastic bearings with steel bearings. Be sure to follow the instruction manual, and apply a sufficient quantity of gear grease to all the moving and stationary suspension parts to avoid limiting movement when the car jumps, lands or takes tight corners.

The next three steps involve the shock assembly and installation, which is very straightforward. The four steps after that encompass attaching both differential systems to the main chassis and connecting the motor's electrical wires to the speed-controller system. The remaining steps involve wheel assembly and installation, and body preparation. As already mentioned, the Thundershot's aerodynamic body is made of clear Lexan plastic, and this should be painted on the underside; any good Lexan paint can be used. Included in the kit is a Lexan chassis cover that envelopes the main chassis tub, so protecting the radio components from

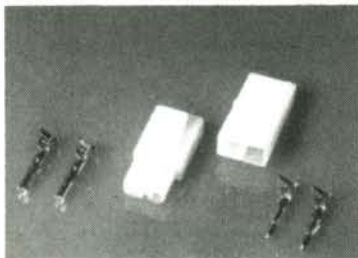
(Continued on page 106)

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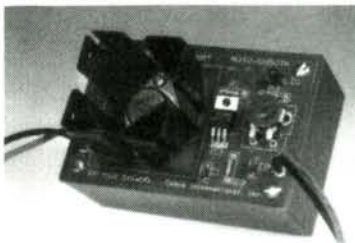
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THUNDERSHOT

(Continued from page 104)

rocks, dust and debris. Now it's time for the rain dance!

PERFORMANCE: To obtain delivery of maximum voltage to the Thundershot's 540 motor, I chose the new Tamiya EX 7.2V Ni-Cd Racing Pack. This pack consists of six computer-matched Sanyo 1.2V/1,700mAh cells connected in series by a new "tabless" design for optimal current flow. After a 15-minute quick-charge, I put the battery in the car's easy-access compartment, closed the swing gate, and all systems were go. Before wheeling the car to the starting line, I went through my usual final radio check: throttle, brake, reverse and steering.

My local test track was still closed for the season, so I called on my photographer cohort, Eric Goldschrafe, and persuaded him to go to a nearby beach for some dune shots. I warned Eric that even though it was a sunny day, he should carry a raincoat, just in case...

For my initial run, I put the Thundershot through its roughest encounter: 15-foot dune jumps. Eric positioned himself at the bottom of the dunes and gave the word. I depressed the Magnum's pistol trigger, and sand and rocks were instan-

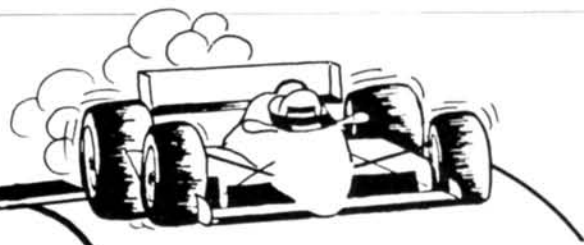
taneously tossed in every direction by all four tires. Even though the sand was extremely soft, the Thundershot sped away with remarkable speed, charging off with true determination. Before I knew it, the car had leaped off the edge of a dune and was in the air. During its short flight, I noticed that the car's rear end was slightly lower than its front, exemplifying a perfect balance in weight distribution. The car landed magnificently on all fours (if the Olympic Committee were judging, the Thundershot would have received a perfect 10), and as long as I continued to feed it power, the car kept going. Dune after dune, the Thundershot jumped and landed perfectly. I noticed a cloud front moving in...

To test the car's cornering and straightaway speed ability, I ran it on the packed sand at the edge of the beach. With a rejuvenated battery pack, I began the test with some simple figure-eight runs. Tamiya has incorporated a new heavy-duty steering linkage into the Thundershot's front suspension group. Because of the improved strength of the linkage, there's no need to toe-in the front wheels to allow the car to take each

(Continued on page 116)

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THUNDERSHOT

(Continued from page 106)

corner firmly and precisely. By adding the front monoshock and anti-roll stabilizer bar, Tamiya has decreased the chance of over- or under-steer both into and out of turns. I tried hard to spin out and to flip the car by running full speed then turning hard left and hard right, but because the

car has an excellent center of gravity, this was virtually impossible to do.

I have only one criticism of the Thundershot: The rear bumper can't protect the rear of the car (especially the shocks and double wishbone arms) from impact when racing against competitors.

If you're looking for fun or for a race buggy with the potential to rule the 4WD

off-road class, then you should seriously consider the Tamiya Thundershot.

Well, there was no rain, just Thunder...

**Here are the addresses of the companies mentioned in this article:*

MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.

Futaba Corp. of America, 555 W. Victoria St., Compton, CA 90220. ■

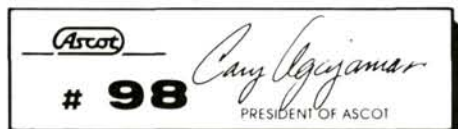


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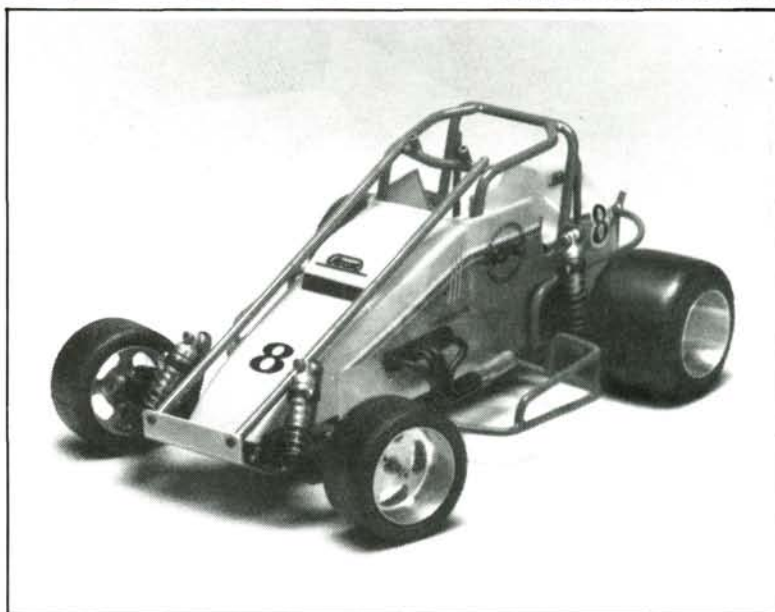
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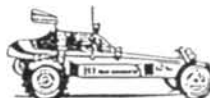
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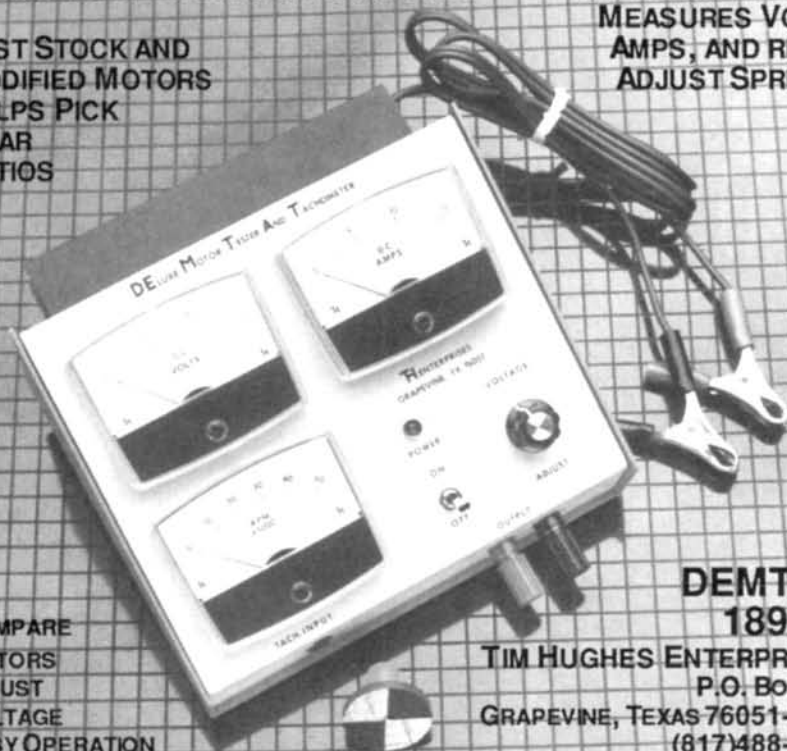
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For more information, contact McAllister Racing, 4545-5H Industrial St., Simi Valley, CA 93063.



ASSOCIATED ELECTRICS

The Yokomo stock motor has set the standard for stock-class racing since 1982. Now, from Yokomo and the Reedy Motor Lab, comes an improved Reedy Competition Stock Motor offering: race-proven reliability; timing-advance for optimum performance and life; and brush heat-sinks for longer brush life and a cooler-running motor. It's ROAR-legal for use in 1/10-scale and 1/12-scale stock-class racing.

For more information, contact Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.



A-MAIN RACING CO.

A-Main Racing, under the guidance of Mike Hendrickson, has developed a new front-wheel-drive performance machine called the "Bullet," which offers the challenge of a 2WD car without sacrificing the reliable performance characteristics of a 4WD car. The Bullet features nine custom-designed graphite chassis and suspension parts, 4WS with adjustable front-to-rear differential, mid-engine motor placement, fully adjustable suspension, three (Delta brand) shocks, 16 NMB stainless-steel ball bearings, Proline tires and an Associated transmission.

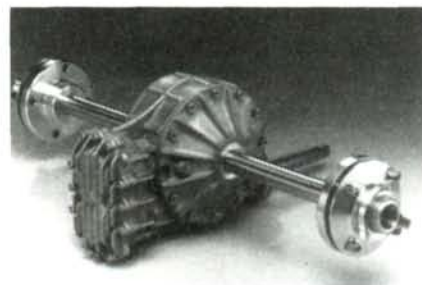
For more information, contact A-Main Racing, 32 East 11th Ave., Eugene, OR 97401.



TECNACRAFT

A new addition to the Tecnacraft modular wheel line are "Spokes"—new wheel centers made to satisfy the varied tastes of R/C car enthusiasts. A selection of wheel centers is available to fit the Tecnacraft modular aluminum wheel. Numerous designs in straight and tangential spokes have been added to the catalog of wheel centers, and Spokes are available to fit any of the currently available Tecnacraft wheels.

For more information, contact Tecnacraft, 1335-B Dayton St., Salinas, CA 93901.



SKELLENGER ENG. CO.

Skellenger's revolutionary new "mini-Halibrand" is an exact 1/4-scale duplicate of Halibrand's sprint-car rear end. Complete in every detail, right down to the ribbing in the side covers, this gem will catch the eye of any racing enthusiast.

The housing is precision-machined from quality 356 T6 aluminum castings and fully encloses the heat-treated steel ring gear and pinion. High-speed ball bearings are included throughout. Quick-change gears made of heat-treated steel allow final drive ratios of 6.765-to-1, 6.073-to-1 and 5.464-to-1. Half-inch axles are available in steel or 2024 aluminum. The drive shaft is 3/8-inch diameter and up to 9 inches long for easy adaptation. Skellenger also offers a complete rear-end package that includes centrifugal clutch, in-board disc-brake and knock-off rear hub kits complete with a drive-shaft U-joint for use with the popular Zenoah 23cc engine.

For more information, contact Skellenger Engineering Co., 2329 South Otis, Santa Ana, CA 92704.



HOT TRICK RACING

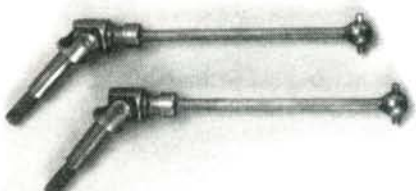
To address the needs of the 1/4-scale racing enthusiast, Hot Trick Racing has just introduced a new line of 1/4-scale racing accessories, including this 1/4-scale Tire Truing Block. Whether you want to give your sprint car a little tire "stagger," or just want to "true" a damaged tire, the Hot Trick Truing Block is ideal for the job.

For more information on this and other 1/4-scale accessories, contact Hot Trick Racing, Inc., 1157 Cushman Ave., San Diego, CA 92110.



PARAGON RACING PRODS.

Paragon Racing Products has developed another innovative device for the serious competitor—the Turbopac. The Turbopac is an on-board system that supplies a constant flow of performance fluid to your electric motor while you're racing. The system can be installed on your 1/10-scale or 1/12-scale on- or off-road car. Send \$2 for a catalog to Paragon Racing Products, 8802 Knollwood Dr., Eden Prairie, MN 55344.



GREAT PLANES

Tired of losing your Tamiya drive shafts in the middle of a race? Do you wonder why no one else has ever come out with some way to keep them in your car? Well, wait no longer! Hobbico has just introduced its new Universal Drive Shafts, made exclusively for Tamiya cars. These shafts combine the axle and drive shaft into a single unit, so eliminating the possibility of the dog bone falling out. The shafts are designed to fit most of the popular Tamiya cars, including the Hotshot I and II, Supershot, Boomerang and the Big Wig.

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.



BOLINK R/C CARS INC.

BoLINK now has a 1/10-scale version of the Merkur XR4Ti Mac Tools road racer, which has won the Trans Am Manufacturers' Championship and the 1988 GTO class of the 24 Hours of Daytona. By using a BoLINK Body Mounting Kit, this body will fit all BoLINK cars and most other 1/10-scale cars.

For more information, contact BoLINK, 420 Hosea Rd., Lawrenceville, GA 30245.



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A new rechargeable soldering gun that offers unmatched power, portability and versatility of performance has been introduced by Ungar, a division of Eldon Industries, Inc. Called the "Ungar 1200 Rechargeable," the gun is suitable for all types of quick soldering jobs and for use in areas where power isn't readily available. This gun will perform like an all-purpose electrical soldering gun, with the added benefits of portability and freedom of operation. The Ungar 1200 is ideal for last-minute trackside repairs on your R/C car, or for use in a workshop where wall outlets aren't readily available. The soldering gun may be purchased separately, or in a seven-piece kit complete with accessory tip, flux brush/pick, 60/40 rosin-core solder and a rugged carrying case.

For more information, contact Ungar, Division of Eldon Industries, 100 West Manville St., Compton, CA 90220.



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For more information, contact Custom Racing Products, 3250 El Camino Real-B3, Atascadero, CA 93422.

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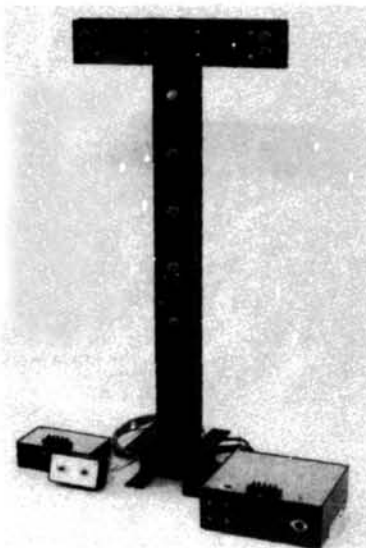
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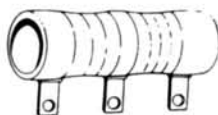
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In keeping with our constant efforts to help foster the growth of the radio-control car hobby, we've decided to run this track directory intermittently to inform modelers where they can race and exchange ideas. If you'd like your track listed, send us your name, address, phone number and some information about the track to **R/C Car Action Track Directory**, 251 Danbury Road, Wilton, CT 06897



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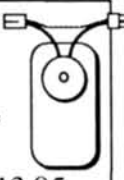
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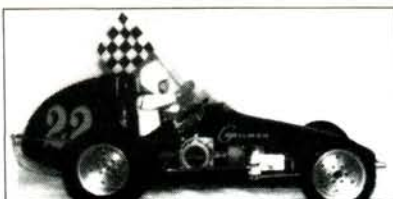
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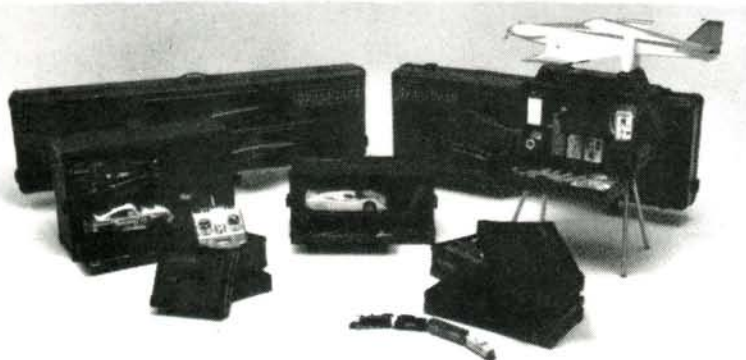


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